RIVERFRONT REDEVELOPMENT IN A MEDIUM-SIZED CITY: TAKING WHITE RIVER SITES IN DOWNTOWN INDIANAPOLIS AS AN EXAMPLE

A CREATIVE PROJECT
SUBMITTED TO THE GRADUATE SCHOOL
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FOR THE DEGREE
MASTER OF LANDSCAPE ARCHITECTURE
BY

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CHAPTER 1. INTRODUCTION

1.1 Project Introduction

Riverfront green spaces are essential to a city's development because of their many benefits. First is the environment advantage and human health. Riverfront green spaces can provide clean recreational places for people, especially for efficient use in urban downtown area. Second is their promotion of urban economic development. As the geographic center of a city, urban riverfronts are often nearest to all residents. They are among the best places to gather people together, and prepare for the city's commercial development.

Indianapolis is the center of state of Indiana. Multiple famous historic and cultural museums and structures are built in downtown area. The White River flows through Indianapolis downtown areas. Some public landscape projects have developed maturely, such as the White River Canal Walk. The Canal Walk is a 3-mile loop pedestrian friendly tourism site with museums, public art, recreation, and parks all around. It attracts over 26 million visitors annually that producing $4.4 billion in economic effect (thestatehousefile.com). Some public landscape projects have been under construction, such as the 16 Tech project located in the southwest of this creative project site. The 16 Tech is an intended Innovation Community that designed to stimulate innovation in life sciences, technology and advanced manufacturing. It will create more than 2,600 jobs in next 10 years (16tech.com). However, some vacant lots still exist along the White River. Using landscape methods to connect these existing noted places, and redesign the

vacant lots along White River and its tributaries, is the major goal for this creative project.

1.2 Problem Statement

There are numerous small vacant lands along the White River and its branches in the core area of Indianapolis. At the same time, there are multiple productive public green spaces along the White River in downtown Indianapolis, such as White River State Park, Lilly Recreation Park, Taggart Riverside Park, Indianapolis Museum of Art, and as well as some thriving residential neighborhoods and developments. However, there are many vacant underutilized and disturbed lands along the river corridor near these productive public green spaces. Indianapolis is endeavoring to discover ways to transform these underutilized sites so they become a network of rich and vital river-edge green spaces in the core of Indianapolis.

1.2.1 Major Problem

How can landscape architecture planning and design principles be applied to transform these underutilized and troubled riverfront sites to healthy and productive private and public landscapes?

How to revitalize the urban underutilized industrial land to healthy and productive public space along the riverfront of Indianapolis?

1.2.2 Sub-Problems

a. How to optimize the urban green networks?

In reality, there is no integrated network to connect these underutilized sites with the green spaces. The diversified riverfront site development along the White River and creeks should be connected. How can these green spaces be unified in way they can promote the redevelopment of the vacant lots and abandoned industrial sites?

b. How to stimulate the local economic development, and minimize the negative environmental impacts to people's life?

The majority of the underutilized sites have been polluted by urbanization and manufacturing. How can these contaminated sites be cleaned up before secondary development and utilization? In the meantime, how to avoid collateral contamination through the economic development promotion?

c. How to attract people back to revitalize urban downtown area?

The other phenomenon is that more people move out from urban center, and live in the suburban area due to the manufacturing decay following World War II. This phenomenon decelerated economic development along the White River, and led to the evacuation of many industrial factories from downtown area. This left behind many vacant sites, and strongly influenced surrounding residents' living qualities. Even though the Back-to-the-City Movement has accelerated greatly since 2000, urban neighborhoods remain less affluent than the suburbs

(FLORIDA, 2016). Therefore, how can people be attracted back to the city in order to accelerate revitalizing urban downtown area and make the downtown area develop balanced?

d. How could a riverfront green space network development improve local people's life through job creation, educational opportunities, history and cultural celebration events?

There are some parks in downtown area, but they still provide less indoor and outdoor activity areas for people. How can more educational and recreational opportunities be provided for local residents? How can the history and culture of the Indianapolis riverfront area influence site design?

1.3 Assumptions

This project makes the following assumptions:

- The project site has already been restored by ecological methods, and the lands could be served without any chemical harm to local residents and visitors after reconstruction of the green space.
- Local government and residents will allow some streets to be redesigned that may be necessary for this project.
- ALL existing structures and land uses that do not align with the determined design program, goals, and objectives will be removed.
- Local government and residents are willing to see the reconstruction and improvement

of the underutilized site.

- Funding exists for the proposed project.

1.4 Delimitations

Due to time limits and resources, the following research issues will not fully address:

- Remediation of the disturbed lands through some physical or chemical methods will not be considered in this project.
- The river-edge along the White River is long, and the project will chose one site in the core area of downtown Indianapolis as an example guiding the following development of the river-edge of White River.
- The project will not include cost estimation.
- The project will not consider further management and provide a maintenance program.

1.5 Methodology

Research methods used in this creative project include literature review, case studies and field study. Literature review provides the background information on riverfront redevelopment and the relationship to urban green networks development. Case studies focus on providing integrated understanding of current theories and successful experiences and strategies for urban riverfront redevelopment. Field study consists of site inventory and analysis and on-site

observation. Site inventory collects factual information about the site and surroundings including site size, circulation, climate, history and existing environmental conditions. Data analysis and on-site observation provide more information of current problems and provide evidence for further design.

1.5.1 Literature review

Literature review as a method of researching this creative project includes two parts. One is review of literature highlighting similar problems that this creative project planned to solve. This part will include four sections: 1）Underutilized Urban/River-edge Sites – Returning to Local Community Uses, 2) Sustainable Site Design for Redeveloping Underutilized Urban River-Edge Sites, 3) Urban Spatial Design for Underutilized River-Edge Sites, 4) Cooperation with commercial development to facilitate the urban economic development. A variety of sources will be referenced, including relevant books, journal articles, magazines, websites, and historical and governmental documents.

1.5.2 Case studies

The case studies will include both system planning, and specific site design projects. At the system planning level, New York City and Philadelphia are classic case studies that illustrate successful urban green space systems along rivers to establish urban green network. Specific

case studies includes Buffalo Bayou Promenade project, Shanghai Houtan park, Millennium Parklands and Cheonggyecheon stream restoration project that will provide detailed design guidelines for the creative project. Some of the projects focus on one problem, but most solve a diversity of problems like those addressed in this project. The purpose of case studies is to find the best system design and development strategies for selected sites.

1.5.3 Field study

Field study includes site inventory and analysis and on-site observation to help exploring existing strengths, drawback, and potential opportunities of the site.

Site inventory collects general information about the site including the White River and related creeks, site history, site size, circulation, climate, and existing environmental conditions. The existing environmental conditions include vegetation, buildings, types of land use, and facilities around the site. Average income, population, gender, and race will also be considered. All of this data will be significant factors that influence the project design.

On-site observation is an important method used to collect site use information. Photography and mapping addresses site scale, people's behavior and activity, spatial relationships, and other important site aspects. On-site observation is essential for learning the most current existing site conditions, and the significance of site inventory data.

1.6 Definition of terms

New Urbanism: The most important urban design movement which raising our quality of life through creating walkable and mixed-use neighborhoods containing a wide range of housing and job types.

Microclimate: The climate of a small area that is different from the area around it.

Aesthetic: Popular ideas or opinions about landscape beauty.

Spatial: The relationship of vertical and horizontal development of a place and human's activities.

Urban Heat Island: a city or metropolitan area that is significantly warmer than its surrounding rural areas due to human activities.

CHAPTER 2. LITERATURE REVIEW

Intro – Reuse of Underutilized Urban Riverfront

The urban riverfront is the dynamic area of cities where the city and river meets. It has been among the richest areas of planning and development in our communities for years. However, riverfronts have moved from prosperous and densely populated to economically depressed and sparsely populated, particularly in Mid-western areas of United States. Industrial decline and the closing of many factories had left behind contaminated lands and surrounding sites that are unsafe for use.

In Indianapolis, there are many productive public green spaces and parks along the White River and its tributaries. However, there is no complete system to connect these green spaces to provide comprehensive benefits to people. Therefore, reuse of these underutilized urban river-edge sites and creation of a complete system to connect the riverfront green spaces are necessary. Prior to design, alternative review is needed. After reading related books and articles, the literature includes the following four sections: 1）Urban downtown riverfront development, 2) Urban riverfront green spaces system development, 3) Site Design Issues Related to Restoration of Disturbed Conditions (Underutilized Urban River-edge Site), 4) The importance of riverfront development.

2.1 Urban downtown riverfront development

2.1.1 Urban downtown issues

In fact, by the 1980's, urban downtown area started the central revitalization plan around the United States (U.S.) (Breen and Rigby 1994). However, why are there still so many vacant lots and brownfields over 30 years later? Also there are more problems with crime, filth, drugs, poverty, homelessness, and racial discord in downtown area. These issues have limited downtown riverfront development greatly.

Another interesting phenomenon is the increasing construction of commercial buildings around U.S. cities in the past 30 years. Between the first CBECS (conducted in 1979) and the latest 2012 CBECS, the number of commercial buildings in the U.S. has increased from 3.8 million to 5.6 million, and the amount of commercial floor space has increased from 51 billion to 87 billion square feet (CBECS, 2012, Figure 2-1*)*. Over 20 percent have been constructed in downtown areas, with particular emphasis on hotels and retail facilities. So, bringing the center back to life is important in solving the urban downtown problems.

Figure 1. In recent years, commercial floorspace has grown more rapidly than the number of buildings

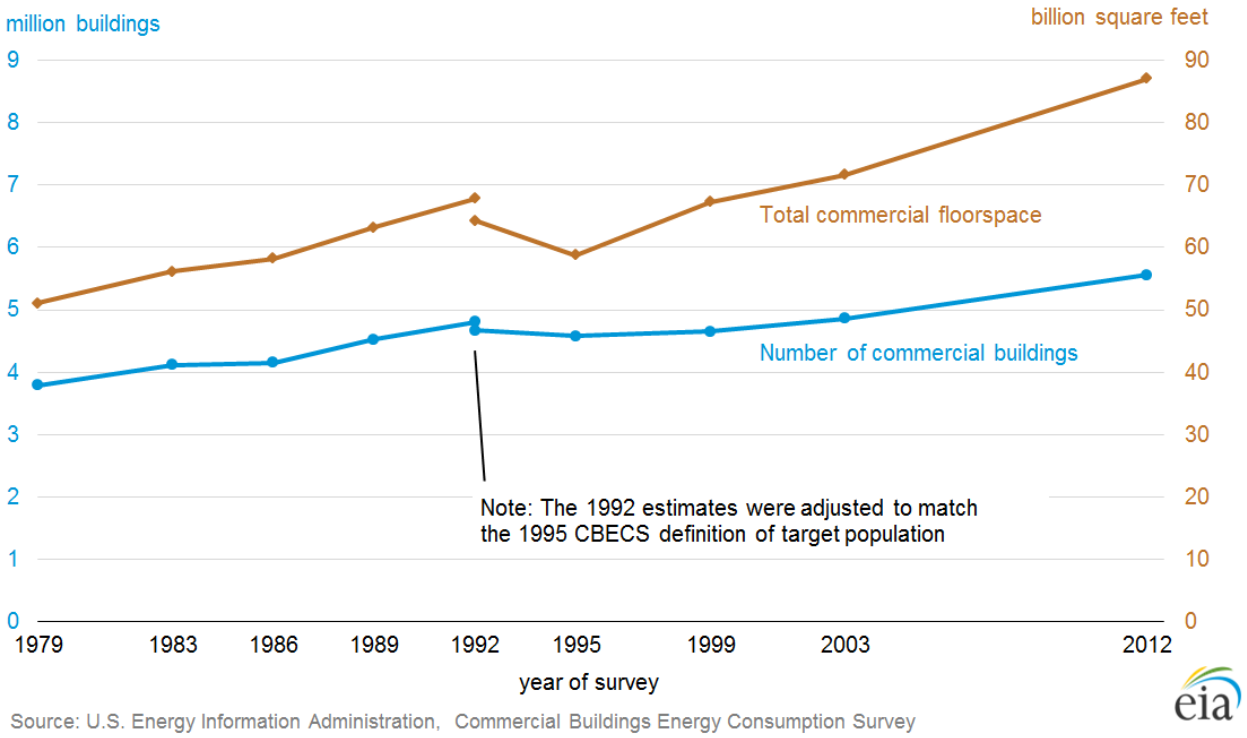


Figure 2-1 (CBECS, 2012)

According to the U.S. National Academies of Sciences, Engineering, and Medicine (Altshuler, 1999), suburbs increased their share from 15 to 31 to 46 percent from 1940 to 1990 period (see Figure 2-2). The increasing population of suburban areas resulted in the decreasing population of central cities and vacant lots generation.

U.S. Population Living in Metropolitan Areas and in Their Central Cities and Suburbs, 1900-1990 (percentage)

	U.S. Population Living in:			Metropolitan Population Living in:	
Year	Metropolitan Areas	Central Cities	Suburbs	Central Cities	Suburbs
1900	25.5	19.7	5.8	77.3	22.7
1910	28.3	21.7	6.6	76.7	23.3
1920	34.0	25.3	8.7	74.4	25.6
1930	44.6	30.8	13.8	69.1	30.9
1940	47.8	32.5	15.3	68.0	32.0
1950	56.1	32.8	23.3	58.5	41.5
1960	63.3	32.3	30.9	51.0	49.0
1970	69.0	31.4	37.6	45.5	54.5
1980	74.8	30.0	44.8	40.1	59.9
1990	77.5	31.3	46.2	40.4	59.6

Note: Metropolitan areas as defined at each census since 1910. Data for 1900-1940 exclude Alaska and Hawaii.
Source: U.S. Bureau of the Census (1990b).

Figure 2-2 (CBECS, 2012)

2.1.2 Urban riverfront benefits

Urban riverfronts play a major role in the efforts to return the city center to economic, emotional and social health. According to a report by the Center for Occupational and Environmental Health at UCLA, urban river parkways are essential for community health improvement. Creation of riverfront green space encourages recreation and connectivity to bring people back to central downtowns and improves community quality of life. For example, riverfront green space provides people activities space for walking, jogging, biking, and access to natural areas. Urban riverfront revitalization also brings some economic benefits such as job creation，government tax and investment increases. It is also a good method to facilitate the city's tourism development.

2.2 Urban riverfront green spaces system development

2.2.1 Return Underutilized Sites to Local Community Uses

Returning to local community use is one of the most basic and significant considerations in reusing the underutilized urban river-edge sites for the creative project. This part will review literature exploring three major functions of riverfront sites for local community: 1) recreation opportunities, 2) accessibility, 3) enhancing local residents' quality of life.

Craig-Smith, Stephen J. and Michael Fagence (1995) introduce the notable opportunities for successful urban riverfront redevelopment and rehabilitation, and examine recreation

opportunities for local residents as a catalyst for the riverfront redevelopment. They also point the way toward principles and guidelines for the accomplishment of functional and recreational harmony in urban environments, which is important for connecting local community and riverfronts. Finding new recreational development for water and riverfront sites can help to enhance the city and preserve the riverfront, and also improve the function of river-edge sites for local communities (Krieger, 2000).

The main problem and challenge of American's riverfronts is the government's hesitant attitude to make changes from commerce to recreation and indicator of a community's health (Is Your Waterfront a Back Door or Front Door, 2013). Therefore, recreation is an important function of river-edge sites to local community as well as the commercial development.

In order to benefit more with local residents, riverfronts need to provide both recreational and educational opportunities for the residents. Ningbo Eco-Corridor provides recreational parks and green space for local residents for family activities, community gathering, square dancing, and many other group activities along the river-edge sites (ASLA 2013 Professional Awards, 2013).

Another key issue of river-edge sites redevelopment is to improve accessibility from the urban riverfronts to local communities (Gordon, 1996). Rachel May (2006) indicated about the importance of integrated riverfront ecosystems for human access to riverfronts. Public accessibility to riverfronts has become a highlight in evaluating river-edge ecosystem

improvement. This public accessibility includes spatial accessibility, visual accessibility, biological accessibility and entertainment accessibility. Spatial accessibility reflects riverfront openness and main transportation convenience, and visual accessibility reflects visual field openness (Che, Yang, Chen, Xu, 2011). Accessibility is related to the utilization of the comfortable environmental river-edge sites, and various activities could attract residents to the riverfronts. Comfort is another important feature that affects the accessibility of urban river-edge sites (See Figure2-3). It includes safety, sanitary conditions, and entertainment. Access to entertainment is also important, and includes consideration of how the elderly, children, and special populations utilize sites (Yang, Chen, Liu, 2000).

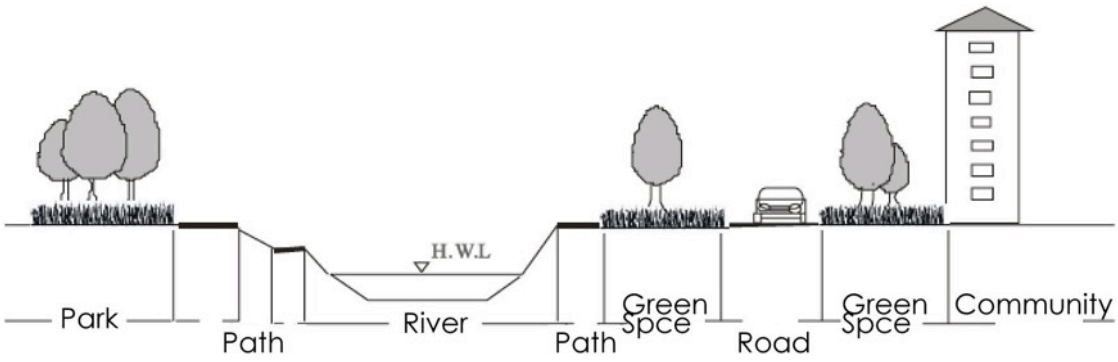


Figure 2-3. Comfortable Access to Local Community (Yang, Chen, Liu, 2000)

Local residents' quality of life also needs to be considered in river-edge redevelopment project. David Gordon (1996) indicated that managing the quality of the physical environment of urban riverfronts is essential to improve the local residents' quality of life. He also emphasizes managing the quality of public realm and the role of urban design guidelines to direct riverfront

development are also beneficial to the local residents' quality of life. Ningbo Eco-corridor (ASLA 2013 Professional Awards, 2013) shows a representative example of the riverfronts' importance to enhance local residents' quality of life. This project is located in a new town of the medium-sized city Ningbo. Designers collected enough information about local history, culture, and hydrological cycle and natural flow of water across the site, and applied them into the riverfronts' design to provide comfortable environment for local residents. This project also provides both recreational and educational opportunities for local residents to enrich their life activities.

Gastil (2002) has deep insights into the condition of the communities and public life, and he mentioned that understanding the local history and development process is helpful for creating better service of riverfronts for local community. Creating high-quality designs for riverfront open spaces and neighborhoods includes diversity consideration, social, economic and ecological factors lead to the quality and restructuring of local communities (Hölzer,2008). In the article *Brooklyn's Vernacular Waterfront*, Campo (2002) suggests using abandoned waterfront facilities and infrastructure to create the local residents' own productive and social environments. He also points out the local informal mutual effects are significant to individuals and riverfront residences. The role of community groups in riverfront change is significant (Hoyle, 1999). The article clearly reflects humans' needs in urban riverfront development, and provides more detailed information for the creative project.

"Community group activists are frequently only too well aware that the problems they face on their urban waterfronts are commonplace in port cities and other urban places, not only in Canada but around the world."

2.2.2 Sustainable Site Design for Redeveloping Underutilized Urban River-Edge Sites

Sustainable site design for underutilized urban river-edge sites redevelopment could be classified into three categories: sustainability in ecology, society, and economy. Many waterfront sites used to be industrial plants in North America, and the government has neglected cleaning and managing the waterfronts for a long period of time. This extracts the significant problem – sustainability, either in ecology, society or economy should be considered in further underutilized urban river-edge redevelopment.

Material recycling is one of the vital elements in sustainability. Campo (2002) suggests an idea that uses abandoned waterfront facilities and infrastructure to create the local residents' own productive and social environments. These uses include simple recreations such as fishing or bird watching, and some organized events like art shows, concerts, and community gatherings. Using recycled materials could reduce the waste materials in former industrial manufacturing facilites, and reduce pollution to the environment.

Another significant element is dynamic development. The dynamic development of waterfront area is valuable post-occupancy in urban riverfront design (Campo, 2002). Sufficient

former investigation and analysis could help reduce the unhealthy development of waterfronts. However, dynamic development is also important to the variety of riverfront social and economic environment sustainable development.

Urban nature is another important aspect for human well-being and for wildlife habitat sustainability. In addition to environmental and ecological impacts, urban nature offers significant social and psychological benefits to human societies. Riverfront nature area is the urban nature that enriches human life (Chiesura, 2004).

River-edge sites have multi-functional and mixed impacts on human life. Riverfronts are the key to connecting commercial and residential, public and private in cities. There is a variety of effects of riverfronts on city development. Riverfronts could be recreation or tourism areas for the city, and could be the link between commercial and residential areas. This is the social sustainability of riverfronts.

Craig-Smith and Fagence (1995) point out the way toward principles and guidelines for the accomplishment of multi-functional, aesthetic, and recreational harmony in urban environments. They also provide a viewpoint that integrates function in the redevelopment of waterfront areas that is highly significant for this creative project.

Accessibility is another vital function for riverfront areas, as it acts as a bridge to connect the commercial and residential area. Gordon (1996) points out that the key issue for riverfront redevelopment is improving physical accessibility to urban riverfronts. This function could be

improved through transportation, greenways, recreational trails, and/or bike trails.

Some riverfront sites could also show education and exhibition value to waterfront redevelopment in urban areas. Goldhagen (2013) pointed out the terrace agricultural fields in Houtan Park are a good example to show traditional agriculture, and have excellent education meaning (See detailed case study information in Chapter 3.).

Shanley (2009) points out that from a sustainability perspective, dense urban environments are more efficient in providing for growing populations, but cities must also be seen as attractive, desirable places to live, and the linear riverfront parks contribute meaningfully to the urban population. He indicates the methods to 'fit' multiple infrastructure systems in tighter and tighter spaces provide potential choices for Indianapolis riverfronts. The Buffalo Bayou Promenade in downtown Houston is a good example to support his opinion (See Figure 2-4, 2-5). The designers create multiple recreational choices for people, such as greenway trails, sun garden, shade garden, pedestrian footbridge, recreational trail system with decorative lighting and interpretive signage(See Figure 2-4). In this project, recreational function, linking function, and exhibition value combine to create a multi-functional urban waterfront.

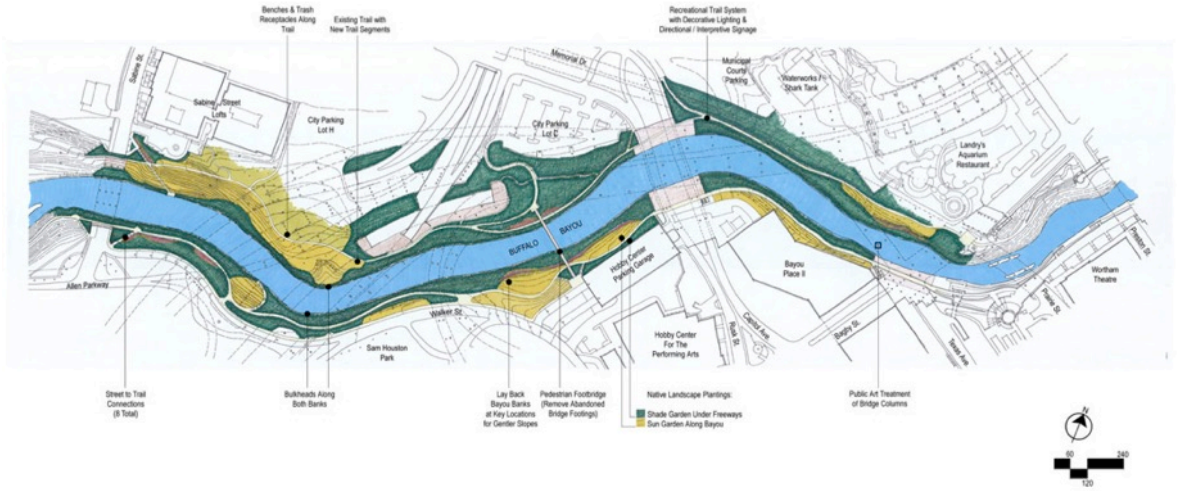


Figure 2-4. Buffalo Bayou Promenade Masterplan *Image source: http://www.landezine.com/*

Figure 2-5. Before and After Construction of Buffalo Bayou Promenade Project (Shanley,2009)

2.2.3 Urban Spatial Design for Underutilized River-Edge Sites

Every modern city has an amazing amount of vacant, underutilized land in its downtown core – hundreds of acres in most major American cities, especially along the river (Trancik, 1986). These vacant places could be redesigned for local resident use either in recreation,

education, or sports. How do we manage these different spaces and make them function well individually? Spatial design for underused river-edge sites could help divide these different spaces. Spatial design could be identified into three urban-design theories: 1) figure-ground theory, 2) linkage theory, and 3) place theory (Trancik, 1986).

In chapter 4 of *Finding Lost Space*, Trancik (1986) introduces these theories of urban spatial design for underused riverfronts. The figure-ground theory is founded on the study of the relative land coverage of buildings and spaces, such as major landmarks or open spaces that provide focal points and sub-centers within the field. Space is the medium of the urban experience, providing the sequence between public, semi-public, and private domains. Therefore, open spaces are important for people's urban activity experience. However, the key of the figure-ground theory is the manipulation and organization of riverfront buildings and open spaces. If the relationship between buildings and open spaces is poorly balanced, fragments become disjointed, falling outside the framework; it will be turned into lost space. In order to manage the river-edge spaces well, building and open spaces should effectively coexist (Trancik, 1986).

Linkage theory is the "lines" that connect one element to another. These lines are streets, pedestrian ways, greenways, or other linking elements that physically connect different spaces. Linkage is the glue that connects open spaces. It is the act by which people unite all the layers of activity and resulting physical form in the river-edge sites. Kenzo Tange proposed an idea about

using circulation systems to connect futuristic forms about new community (Trancik, 1986). This is also useful for riverfront design. Using networks of pathways linked by experimental structures at various levels help develop multi-level transportation of riverfronts and improve recreational interests for local residents (See Figure 2-6). The spatial opportunities of urban riverfront redevelopment need high technology domination and aesthetic support.

Figure 2-6. Kenzo Tange. Expo 79. Osaka, Japan, 1970.

Gospodini (2001) points out one consideration for the redesign of riverfront space is the main morphological and spatial characteristics exhibited in common by urban cities and their riverfronts. Cities have their own characteristic culture and history, which could be constructed

spatially for riverfront redevelopment.

The essence of place theory in spatial design lies in understanding the cultural and human characteristics of physical space. *Space* could become *place* when it is given a contextual meaning derived from cultural or regional content (Trancik, 1986). The riverfronts need a relatively stable system of places to develop local residence, social lives, and local culture. This stable system contains both spatial stability and horizontal stability. Spatial stability keeps the cultural, social, or physical environment steady, and also provides a harmonious environment for local community uses.

The urban riverfront is an interesting and complex spatial location, and industrial or vacant river-edge sites need to undergo transformative processes to become livable human activity places for local communities (Bunce, 2007). The riverfront is not only a single line along the river. Another function of river-edge sites is the connection between the communities and riverfronts (*Can L'Enfant Plaza Become a Place for People?*, 2013). How can we connect the "urban garden promenades" and extend the riverfront so it can offer people a harmonious experience in the urban environment? Spatial design provides an opportunity for connecting urban space and the riverfronts.

2.2.4 Cooperation with commercial development to facilitate the urban economic development

Local community use is a major purpose for urban riverfront redevelopment. Commercial

and economic development cannot be ignored in the urban river-edge sites development process. It could bring many benefits to the local community. Not only would it boost leisure and tourism, but riverfront economic development can also make important contributions to human health, well-being, and quality of life for local residents (Hopkins, 2005).

A notable opportunity for successful urban waterfront redevelopment and rehabilitation is commercial development. This study examines recreation and tourism as a catalyst for waterfront commercial redevelopment. Function combining with aesthetic in the commercial redevelopment of riverfront area is highly significant for this creative project (Craig-Smith and Fagence, 1995). Hölzer and Wiethüchter (2008) also suggest that economic factors lead to the quality regeneration and restructuring of riverscapes. Commercial development could facilitate economic development that leads to the improvement of local residents' quality of life.

In the article *Financing Urban Waterfront Redevelopment*, Gordon (1997) states that huge costs for site clearance and infrastructure need more input before significant project implementation begins. All these need cash contributions from the sponsors/stakeholders. Governments or public institutes may not have much money for the restoration and rehabilitation of urban waterfront redevelopment or further maintenance. This means designers must incorporate natural and social development with commercial development. Commercial development could help the riverfronts support the maintenance fees through the commercial activities and income. It is also beneficial for the long-term development for both riverfront

landscape and local community.

Besides creating the income through commercial development, there are some other methods to reduce the river-edge site reconstruction costs. Reuse of industrial materials and infrastructure from the local site can reduce transportation and production costs. It is also essential for landscape designers to know more about how to achieve sustainable goals in all aspects of the project (*Design the Waterfront Park Infrastructure of the Future*, 2012).

Cheonggyecheon stream restoration is a successful real project located in Seoul, Korea. This project attracts many visitors and increases local income through effectively changing the microclimate environment. It proves that it is not only important to consider the ecological development, but also to care about the local economic development in urban riverfront development (Landscape Architecture Foundation, 2014).

"The project attracts an average of 64,000 visitors daily. Of those, 1,408 are foreign tourists who contribute up to 2.1 billion won ($1.9 million USD) in visitor spending to the Seoul economy."

"Increased number of businesses by 3.5% in Cheonggyecheon area during 2002-2003, which was double the rate of business growth in downtown Seoul; increased the number of working people in the Cheonggyecheon area by 0.8%, versus a decrease in downtown Seoul of 2.6%."

New York City offers the "sustainable framework" that may optimize access to the

waterfront, creates new recreational spaces and natural habitats, enhances the use of water-based transportation, and provides new opportunities for urban redevelopment. It contains the budget for the program, and is helpful for measuring the feasibility of this creative project (*NYC Creates the Model Waterfront Plan*, 2011).

2.3 The importance and benefits of riverfront redevelopment

Urban riverfront regeneration has been addressed by governments since 1960s. There are several benefits of riverfront redevelopment/regeneration, such as increase urban values in environment, history and culture, providing opportunities for new uses and activities, reforming public transportation, and improve economic values of waterfront development.

Riverfront regeneration will increase urban values in three aspects: environmental values, historic values, and cultural values. Replanning the communities along urban river will provide construction opportunities for community parks, and increase green public space for local residents. It will also called attention to the need for greater historic and cultural preservation for the city.

Most riverfront redevelopment project sites used to be polluted or vacant land, however, riverfront restoration will create green public spaces to attract people and business activity. Besides that, it will also boost tourism development and attract new commercial opportunities. For residential use, providing multi-purpose spaces are also encouraged besides parks, trails, and

playgrounds.

In order to provide better public services for people, designers need to reform the transportation in riverfront redevelopment process. On the basis of traffic requirements, designers will consider both motor vehicle routes and pedestrian routes. The Cheonggyecheon restoration project is an excellent example in reforming the urban public transportation. In order to finish the Cheonggyecheon restoration plan, the original 18 traffic lanes elevated highway was demolished. Instead, the government recommended a mass transit-oriented system to solve the problems. This was accomplished by increasing the capacity of buses and subways. Therefore, the Cheonggyecheon restoration project prompted a fundamental transition to a public transit system. The Cheonggyecheon restoration project also provides a significant connection between various city attractions in addition to its importance as a pleasant place. Other attractions in downtown area were connected through pedestrian roads, optimizing the overall value of the public transportation. Reduced traffic volumes in the Cheonggyecheon area reinforced the living quality in the downtown Seoul.

The redevelopment of urban riverfront areas will generate significant economic benefits according to some existing projects. Similar to the redevelopment of Shanghai Xintiandi area project, it is not only promoting and internationalizing the city by attracting and retaining professionals, but also helped to raise revenues for local governments.

CHAPTER 3. CASE STUDY

This chapter contains three case studies that demonstrate multi-functional purposes such as ecological, commercial, recreational, and educational, all of which are applicable to this creative project. They are Shanghai Houtan Park, Millennium Parklands, and Cheonggyecheon Restoration Project.

3.1 Shanghai Houtan Park

Location: Shanghai, 2010 Shanghai Expo Park, China

Size: 14 hectares (34.6 acres)

Start date: at the beginning of 2007

Completion date: October, 2009

Designer: Turenscape (Beijing Turen Design Institute)

Design Principal: Kongjian Yu, International ASLA

Client: Shanghai Expoland ltd.

Consultants: Su Shouliang, Shanghai Qite Landscape Company; Xu Lian, Shanghai Xiandai Design Group

Land use type: Park/Open space, Waterfront redevelopment

Awards: 2010 Professional Awards, ASLA

Brief description:

Shanghai Houtan Park was a model “productive landscape” made by Kongjian Yu. It is located near Shanghai Huangpu river, and built on a brownfield of a formerly garbage-strewn industrial land. The park pumped water from Huangpu River, and cleaned the polluted water after a series of bio-purification and filtration. The project contains artificial wetland, flood control, ecological restoration, and reuse of industrial materials. This project shows a model that landscape project is not only aesthetic, but has other functions like ecological restoration.

Figure 3-1. Master plan of Houtan Park and bird’s-eye view from southwest

Image source: https://www.asla.org/2010awards/006.html

Project background:

The project is designed for 2010 Shanghai World Expo, China. It used to be Iron and Steel Plant, and Houtan Ship Repair Plant site. Before Houtan park built, the Binjiang ecosystems were destroyed and the environment was polluted. Wastewater and the Pier storage yard damaged the Binjiang fragile ecological system. There are only little wetland ecological communities existing in the western part of the site.

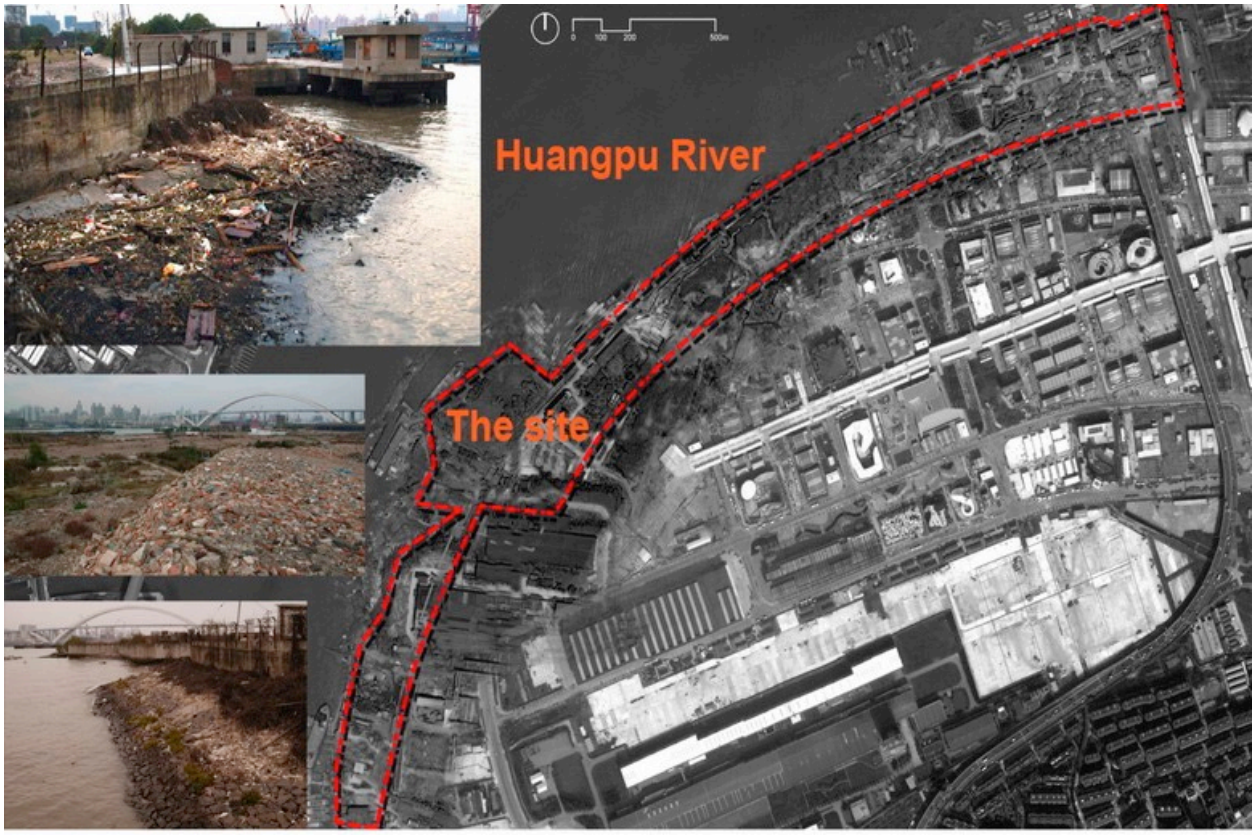


Figure 3-2. The pre-existing conditions of the project

Image source: http://www.descroll.com/design/shanghai-houtan-park-by-turenscape

Design concept:

Biological water purification, flood control, and the local and cultural notion of water consist of Houtan Park design concept. The Huangpu river water was pumped into the site and cleaned after several biological processes. The wetland has two zones that are divided according to its ecological functions. The outer zone is natural wetland, and the inner zone is artificial wetland.

The terrace agricultural fields are good example to show traditional agriculture, and have excellent education meaning.

Significance:

- 500,000 gallons of water can be purified through ecological methods from Lower Grade V to Grade III everyday.
- The project could save half a million dollars compared with traditional water disposal.
- The project attracts more plants species, birds species, insects species coming back, all these species are disappeared for a long time.
- The project could also reduce flood beside the Huangpu river.
- The reclamation of industrial structures and materials shows the industrial spirit of Shanghai. The project also saves money from disposing abandoned industrial materials.

Challenge:

- The Huangpu river was highly polluted, it is very difficult to purify the fetid water into clean water. It is also hard to restore the degraded environment.
- The existing concrete floodwall was not suitable for protection the shoreline from erosion. Improve flood control also faces many difficulties. The existing 22 feet high concrete floodwall aimed to protect against 1000 year flood, but it is rigid and inanimate.
- The site is long (1 mile) and narrow shaped, it is difficult to completely treat the polluted water in such a narrow long shaped site.

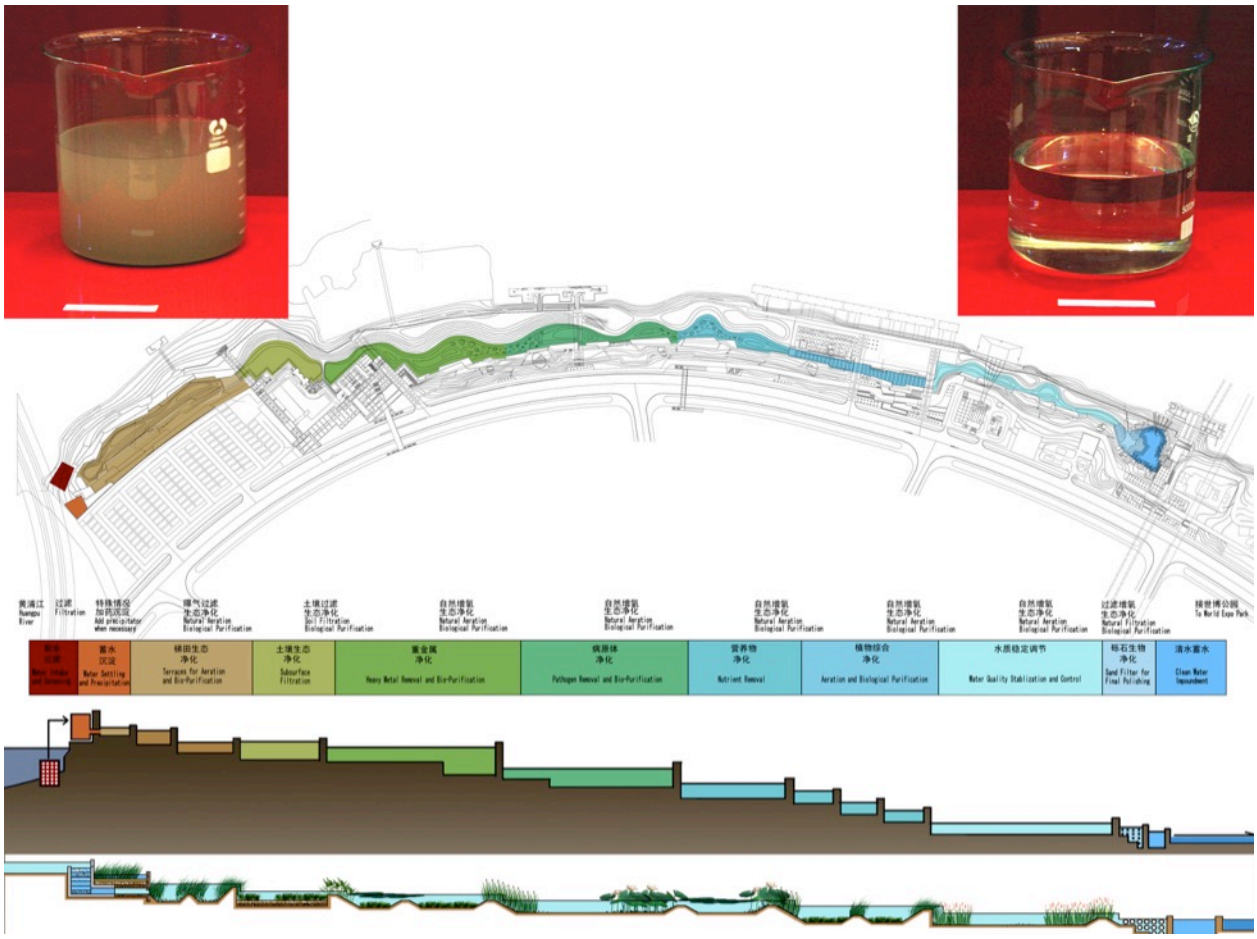


Figure 3-3. The water-cleaning mechanism of man-made wetlands

Image source: https://www.asla.org/2010awards/006.html

Target population:

- Visitors during 2010 Shanghai World Expo, residents and visitors after Shanghai Expo

Featured design:

- Terraces for Aeration and Bio-Purification
- The hanging garden-reused industrial structure
- Urban agricultural field that contains naturalistic bamboo, tall rustling grasses, green clover, sunflowers and rice plants. This provides opportunities for residents and visitors know about Shanghai agriculture heritage.

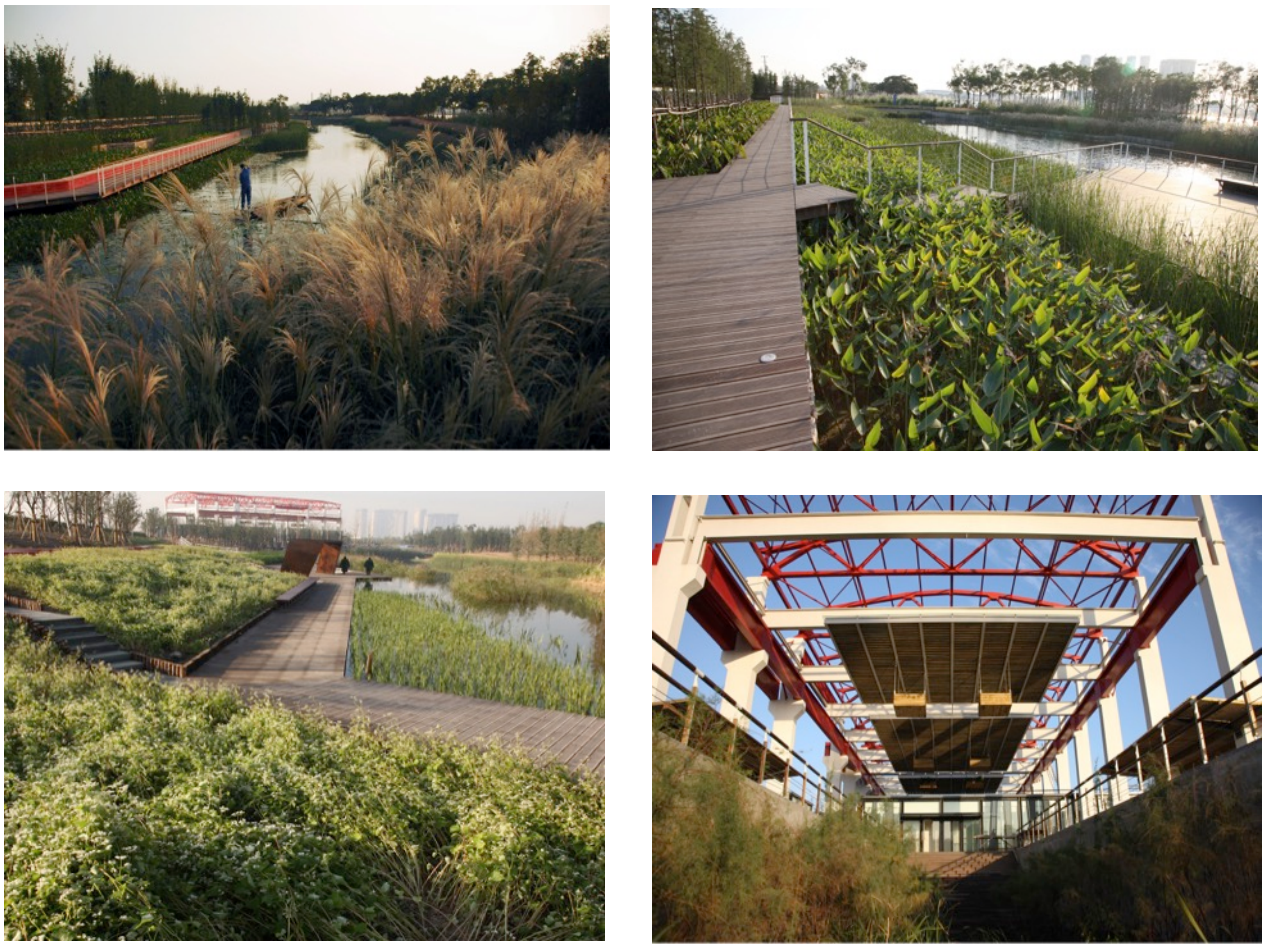


Figure 3-4. Terraces for Aeration and Bio-Purification & The hanging garden

Image source: https://www.asla.org/2010awards/006.html

3.2 Millennium Parklands

Project name: Millennium Parklands (Sydney Olympic Park)

Location: Sydney, Australia

Size: 1000 acres

Completion date: 2000

Designer: PWP Landscape Architecture

Design Principal: Peter Walker

Client: Sydney Olympic Park Authority

Consultants: Principal Concept Plan Leader: HASSELL; Engineering: David Abbey, Kinhill Engineers; Lighting Design: Barry Webb and Associates; Planting Strategy: Bruce Mackenzie Design

Land use type: Park/Open Space

Awards:

- 2000 AILA National Awards – Project Award in Landscape Architecture – Planning - Master Planning;
- 2000 AILA National Awards – Project Award in Landscape Architecture – Design - Rehabilitation and Conservation;
- 1999 AILA (NSW and ACT) Awards – Merit Award - Achievement in Landscape Architecture - Master Planning

Brief description:

The Millennium Parklands is surrounding the Olympic Park to undertake the former and connecting the site to Homebush Bay and the Paramatta River. The Millennium Parklands has a plan schedule for over 20 years, and only some design completed in time for the 2000 Olympic Game. The site used to be extremely contaminated with heavily metals, PCBs, and toxins. The Parramatta River and creek are also polluted by chemical factory. Peter Walker and his team use ecological method to clean the site. It is the recreational park for resident and visitors, and the educational site for students now.

Figure 3-5. Birds-eye view of Millennium Parklands

Image source: http://www.pwpla.com/projects/millennium-parklands/#!/6

Project background:

The site used to be a monumental slaughterhouse in 19th century and the industrial precinct

of Sydney for a long time. It used to be heavily polluted. The Sydney government chose the site Homebush Bay to be the 2000 Summer Olympics that surprised many people. They need to change the heavily polluted brownfield into an inhabitable space.

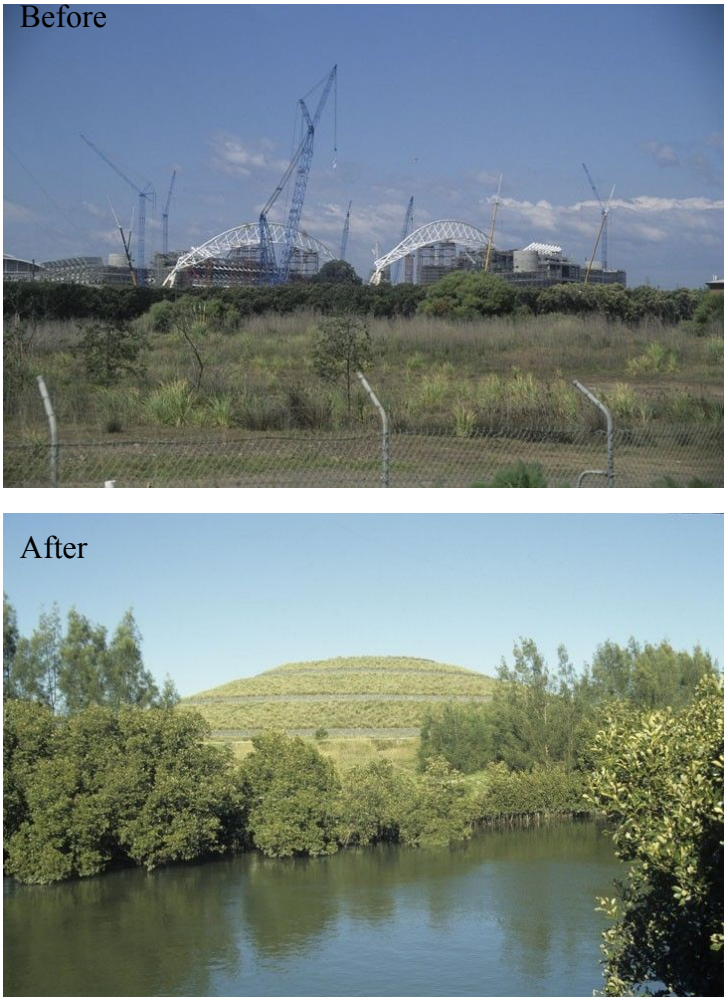


Figure 3-6. Before & After Comparison of Millennium Parklands *Image source: https://landscapeperformance.org/case-study-briefs/sydney-olympic-millennium-parklands*

Design concept:

Before the park was built, it was heavily contaminated with industrial waste. The designers need to use ecological restoration to clean the site and purify the river and creek. The method was to create the self-purification system using technical water recycling system and native plants. Then provide recreational and educational opportunities for visitors and resident.

Figure 3-7. Masterplan of Millennium Parklands *Image source:*

https://landscapeperformance.org/case-study-briefs/sydney-olympic-millennium-parklands

Significance:

- One significant aspect of the project is restoration and linkages of the native ecologies, like recovery of the man-made Haslam's creek, purification of the dirty water for irrigation, and

several wetlands.

- Another significance of the project is the network of pedestrian and bicycle paths through the Millennium Parklands. This provides opportunities for visitors to experience the local ecologies, the open space topography, and the waterfront boardwalk.
- The project also provides education opportunities for local students, they could attend the environment education programs in the Millennium Parklands.
- The project also protects the endangered species, like the endangered frog was found in the quarry, the Golden Orb spiders.

Challenge:

- The terribly polluted site needed to be excavated according to Peter Walker, but the environment limitations lead the designers can only treat the soil on-site.
- Connecting the Millennium Parklands and Olympic Park with a common image is another challenge for the designers. The designers need to unify Homebush Bay as a whole.
- 65% of the site soils need to be excavated and managed on-site.

Target population:

- Visitors, local resident, and school students

Featured design:

- Brick pit/art park – a viewscape for Olympic Park and a unique node of Millennium Parklands
- The switchback bridges and ramps – designed according to the natural curves of the canyon
- Naturalistic pool – treat graywater cradles one edge of the site
- Geometric wetland – a physical barrier between the public space and the preserved habitat

3.3 Cheonggyecheon Restoration Project

Location: Cheonggyecheon stream, Seoul, South Korea

Length: 100 acres, 3.6 miles (5.84 km) long

Dates: 2000-2005

Cost: $380 million USD Total project; $120 million USD Landscape portion

Designer: SeoAhn Total Landscape

Design Principal: Mikyoung Kim

Client: Seoul Metropolitan Government

Consultants: Aqua-tech Inc. (Fountain); Rainbow Engineering (Irrigation); KECC Engineering (Civil Engineer); CheongSuk Engineering (Structural Engineer); Suenghoi Kim (Bridge and Walls); Crerux, Seam Lighting Inc. (Lighting)

Land use type: Park/Open space, Stream restoration

Awards: 2009 Professional Awards, ASLA

Brief description:

Cheonggyecheon Restoration Project flows across the Central Business District in Seoul. The project aimed at improving people's quality of life and promoting the importance of functioning ecosystems. The project created both ecological and recreational opportunities along the 3.6 miles corridor in the center of Seoul through demolished an elevated freeway and uncovering a section of the historic Cheonggyecheon Stream. The Cheonggyecheon Restoration

Project has been facilitating and motivating the economic growth and development in an area of Seoul in the past decade.

Figure 3-8. Night view of the Cheonggyecheon Stream

Image source: https://designtoimprovelife.dk/finalist2011-27/

Project background:

After the Korean War (1950 – 1953), more people moved to Seoul and settled down along the Cheonggyecheon stream in temporary houses. This brings a lot of social problems, like trash, environmental pollution, and hustle. The government decided to cover the stream with concrete in 1958, and an elevated 12-lane highway was constructed in 1976. It made the situation more seriously, such as degradation of surrounding area, poor water quality, poor quality of the natural environment and lack of plant and wildlife, and the construction safety problems (Only small cars were allowed to pass through the elevated highway from 1997).

Figure 3-9. Before & After Comparison of Cheonggyecheon Stream *Image source: https://landscapeperformance.org/case-study-briefs/cheonggyecheon-stream-restoration#*

Design concept:

The design has three concepts: history, urban and culture, and nature in the middle of the city. The concepts reflect in the different region of the project. History reflected in the underground waterways to create a new stream bed with landscaped banks. Former bridges were

transformed into decorative elements and seating to encourage people remaining in the space. In the business center area of Seoul, the waterfront park was designed with environmentally friendly materials, with artwork on walls along the river edge with recreation areas. In the middle of the city, the design looks more nature and wetland assigned as an ecological conservation area.

Figure 3-10. Conceptual site plan *Image source: https://landscapeperformance.org/case-study-briefs/cheonggyecheon-stream-restoration*

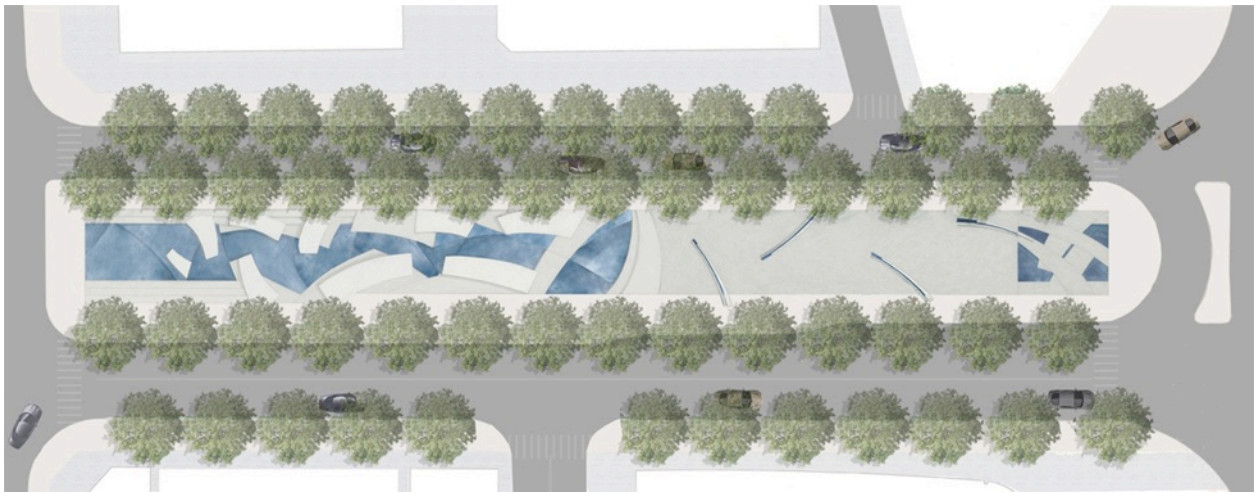


Figure 3-11. Site plan at the beginning of the Cheonggye Stream

Image source: https://www.asla.org/2009awards/091.html

Significance:

- The first significance of the project is accelerating the urban renewal and revitalization, and bringing economic growth at a high rate of speed and tourist attraction.
- The project shows the significant ecological improvement, and air and water quality improved.
- Another significance is providing opportunities for public access to the river – fishing and bathing.
- It is also providing educational resource for the public, and shows the historical and cultural values reflected in design.

Challenge:

- Safety problems of the aging elevated freeway and concrete deck covering the Cheonggyecheon stream needs to be solved.
- Connectivity between the city's north and south sides needs to be improved.
- Traffic congestion and chaos in the northern end of the city will be increased after removing the elevated freeway.
- It is difficult to create a consistent urban landscape since the water is not naturally present in the Cheonggyecheon for most of the year except summer rainy season.

Figure 3-12. Safety problem of the aging elevated freeway

Image source: https://www.slideshare.net/simrc/cheong-gye-cheon-restoration-project

Target population:

- Visitors, local residents

Featured design:

- The 3.6-mile continuous green corridor for pedestrians, bicyclists, and wildlife.
- Adding 22 bridges (12 pedestrian, 10 for automobiles and pedestrians) to improve the connectivity within the transportation network.
- Connections between waterways were reestablished through the restoration project. The Cheonggyecheon runs into Jungraechon stream and finally flows into the Han River. At their meeting point, it is designed as ecological conservation wetlands.
- 120,000 tons of water is pumped from the Han River and several subway pump stations and

treated to create a consistent flow with an average depth of 40 centimeters in Cheonggyecheon. It is designed to solve the water shortage problems except summer rainy season.

- Terraced vertical walls provide visitors access as water levels change, create seasonal interest, and provide flood protection for the city.
- Natural stones bridge the stream banks, providing walkways for pedestrians and to helping decrease water speeds.
- Reuse of the materials – construction materials were re-used from the concrete deck structure and elevated highway demolition. 95% of concrete and asphalt and all of the scrap iron were reused.

Figure 3-13. Bridge, Terraced vertical walls, and Stepping stone bridge

Image source:

https://landscapeperformance.org/case-study-briefs/cheonggyecheon-stream-restoration#

https://lacreekfreak.wordpress.com/2009/04/24/daylighting-in-the-heart-of-seoul-the-cheong-gye-cheon-project/

CHAPTER 4. SITE INVENTORY & ANALYSIS

4.1 Introduction

The project site is located northwest quadrant of downtown Indianapolis (Figure 4-1), between Fall Creek Blvd to the north and Central Canal to the south. It is underutilized land surrounded by public services plants and manufacture plants. The proposed creative project aims to redesign the abandoned site to provide the living, working and recreational opportunities for both existing and further residents, and tourists.

Figure 4-1. Site Location

4.2 Site Selection

Indianapolis is a medium-sized city in the Midwest of the U.S., which has the White River that flows through the downtown area. Like many other Midwest cities in the U.S., excellent geographical location and environment circumstance facilitated the rapid industrial development in the early 20th century. As time goes, the decline of industry in the middle of 20th century creates lots of environment and social problems, such as riparian degradation, land

contamination, population loss, and increased crime. Since the 1980s, the government started urban center revitalization plans around the U.S. However, there are still many contaminated lands along riverfronts. Therefore, finding an appropriate solution to solve these problems is necessary to provide a reference for other underutilized riverfronts around the U.S..

Many other cities also have similar riverfronts problems, like Minneapolis, San Antonio, Philadelphia, and Pittsburgh. Some issues have been solved through riverfront landscape regeneration, which would provide suggestions for this creative project. The contaminated and underutilized lots along the White River and its tributaries in Indianapolis share a lot of problems with other polluted riverfront sites in other Midwest cities around the U.S. Accordingly, it is advantageous to select the contaminated and underutilized riverfront site along White River and its branches to provide the demonstration to other similar projects.

4.3 Site Location

This creative project site is located on the northwest side of downtown Indianapolis, IN (see figure 4-2). It is underutilized industrial land adjacent to I-65. The site's boundary is between the Fall Creek Blvd to the northwest side, the Central Canal to the south, and the Dr. M.L.K. Jr. Street to the east.

Figure 4-2. Indianapolis, Indiana Image source: Googlemap.com

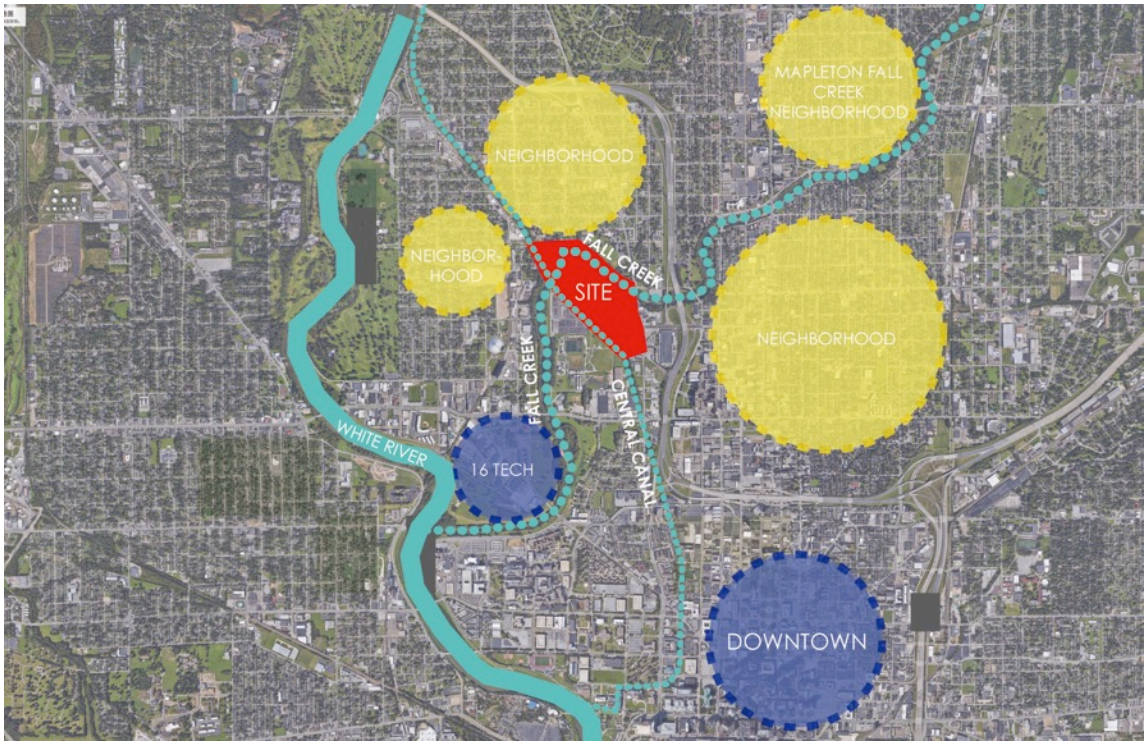


Figure 4-3. Site Inventory

4.4 Site Context

4.4.1 Introduction

Along the southeast boundary of the approximately 93-acre site are Republic Services waste management, Moving & Storage warehouses， and the Home City Ice company. Parking lots and abandoned plants occupy the majority area of the site (see figure 4-4). The area is well fenced along the south side adjacent to the White Water Purification Plant and the Salvage Yard, as well as the west side along Fall Creek (detailed photos see Part.4.5 Current Site Conditions).

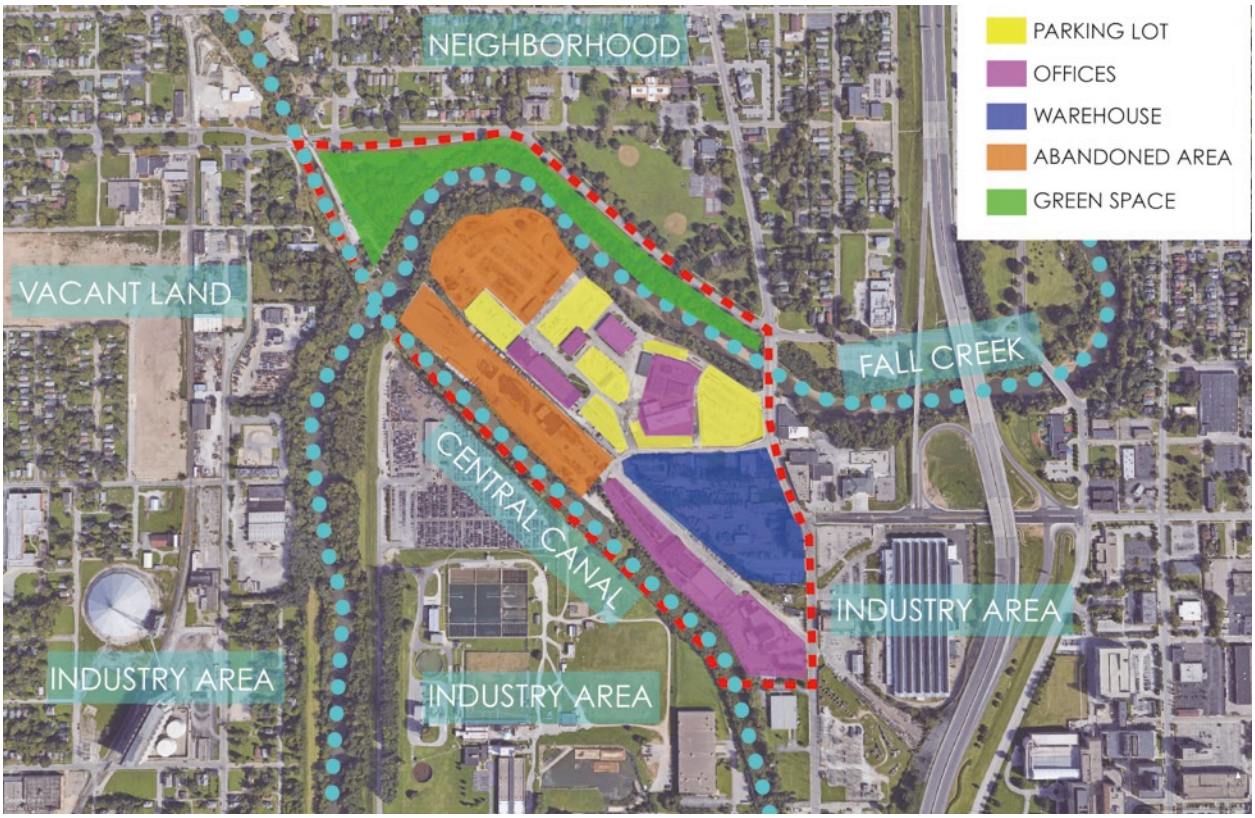


Figure 4-4. Enlarged Site Inventory

The project site is surrounded by various land uses, including the White Water Purification

Plant and some other public service plants in the south and southeast side. The east side across Highway I-65 is the IU Hospital and residential communities. Watkins Park is in the north of the site across the Fall Creek, as well as the Indianapolis public library, Ivy Tech Community College, and the Children's Museum. Rest of the north and west area are residential use land. Looking to the west, Riverside Park and Golf Course where beside the White River are within 1 mile from the project site. The downtown of Indianapolis is in the near south area, and it could provide potential visitors to the project site (see figure 4-5).

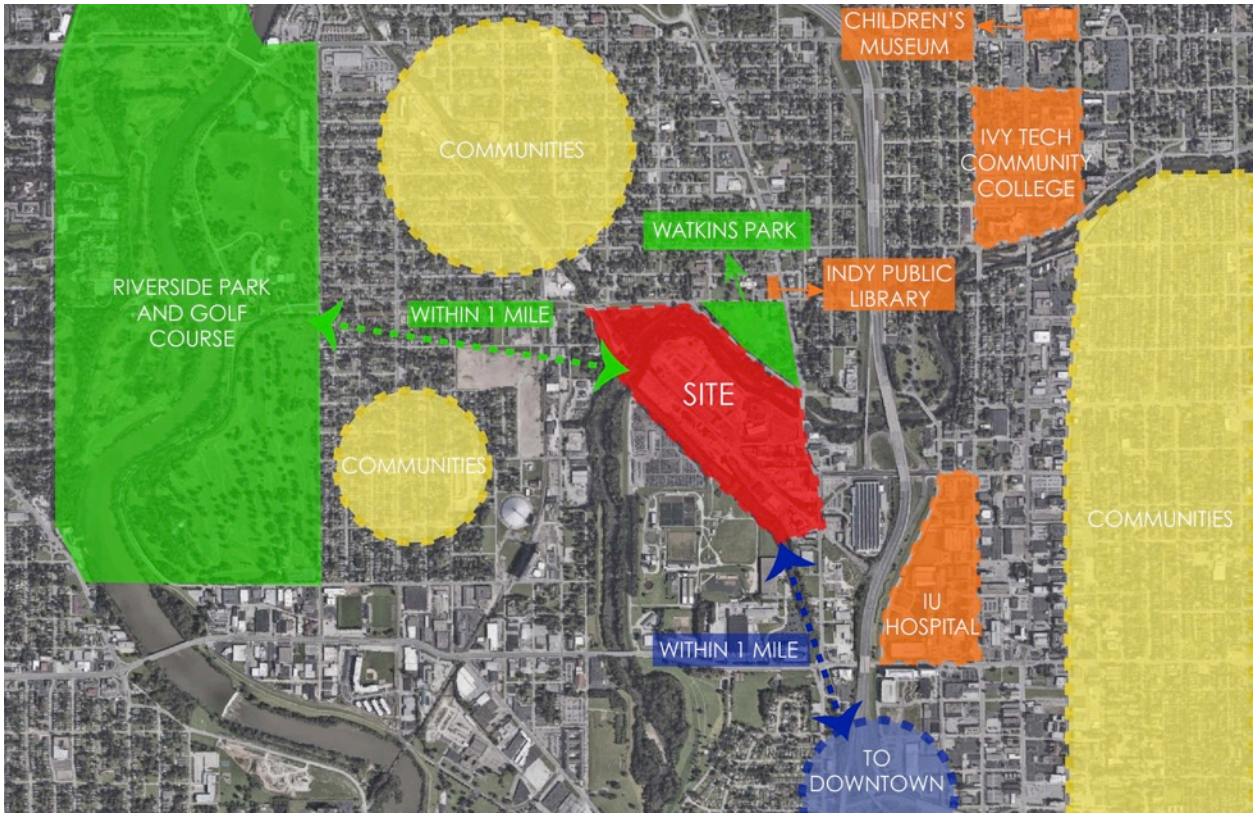


Figure 4-5. Site Surrounding Context

Fall Creek (north and west site boundary) is a branch of the White River. Central Canal (southern site boundary) played an essential role in the development of Indianapolis. The

Indianapolis Water Company started to use the canal water as a source for the White Water Purification Plant from 1904. From there, the water from the canal was used for both drinking and aquatic intentions, and the utilization of the Central Canal was maintained throughout the next half century (historicindianapolis.com). Part of the Central Canal was covered between the site and the Canal Walk starting point, which is partially similar to the Cheonggyecheon Restoration Project. Since part of the canal was covered by I-65 and was not able to be exposed, only partial canal as south boundary of the site will be uncovered as the landscape space of the creative project.

There are no greenway trails that pass through the site. The nearest trails are the Fall Creek Trail on the northeast side, Towpath Trail in the northwest along the White River, and the downtown Canal Walk along Central Canal. The distance between the project site and all the three trails is around 1 mile, and this could be easily connected with greenway trails in the future (see figure 4-6)

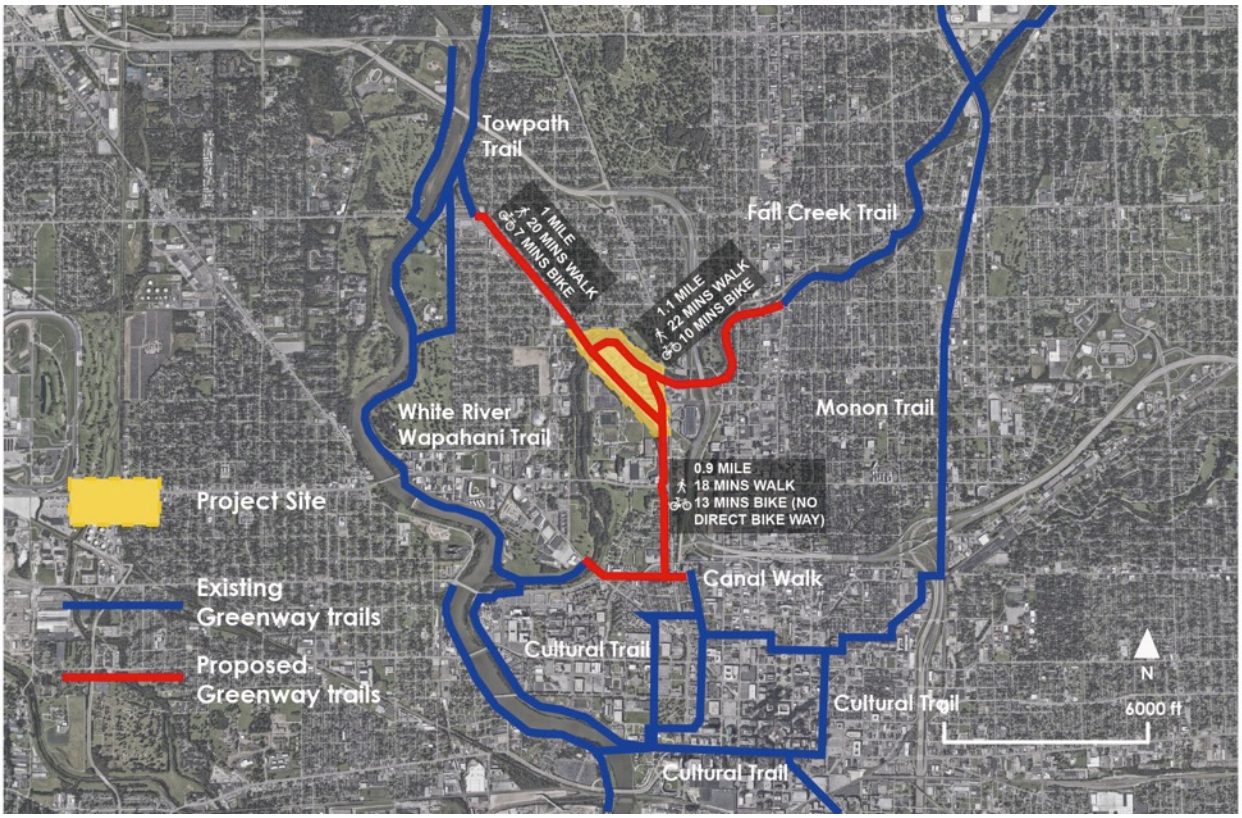


Figure 4-6. Further Greenway Trail Connection Possibility

4.4.2 Transportation Analysis

The project site is surrounded by intricate traffic patterns including freeways, arterial streets, local streets, railroads, and greenway trails.

The east of the site is Dr. M.L.K. Jr. Street and exit 115 of elevated I-65. These roads bring more opportunities for vehicular traffic to visit the site. The current transportation situation of this area is suitable for the main entrance and parking design on the east side of the project site (See Figure 4-7).

The north boundaries of the site are Fall Creek Blvd and Burdsal Pkwy, which connect the

northern residential area with the site. They are not busy traffic streets. However, there is no access from the roads to the site across Fall Creek. It is an opportunity to create an access for the residents (See Figure 4-7).

An abandoned railroad comes from the northwest through a bridge above Fall Creek. The security gate prevents people from entering the railroad bridge (See Figure 4-7).

There are several greenway trails around the site, including Fall Creek Trail, Towpath Trail, White River Wapahani Trail, Canal Walk, and Indianapolis Cultural Trail. The site is a suitable place to connect all the trails (See Figure 4-6).

From the site context transportation map (See Figure 4-8), there are five schools around the site within 30 minutes walk or 5 minutes drive. There is a great potential to provide public open space for activities and study area to welcome the nearby students to the site. The project will resolve the public entrance problem along Fall Creek side since four schools and most neighbors are located on the northwest side of the project site. The bus route #34 drives through the east edge of the site, and there are three existing stops along the eastern edge of the site. It provides more opportunities to bring people to the site.

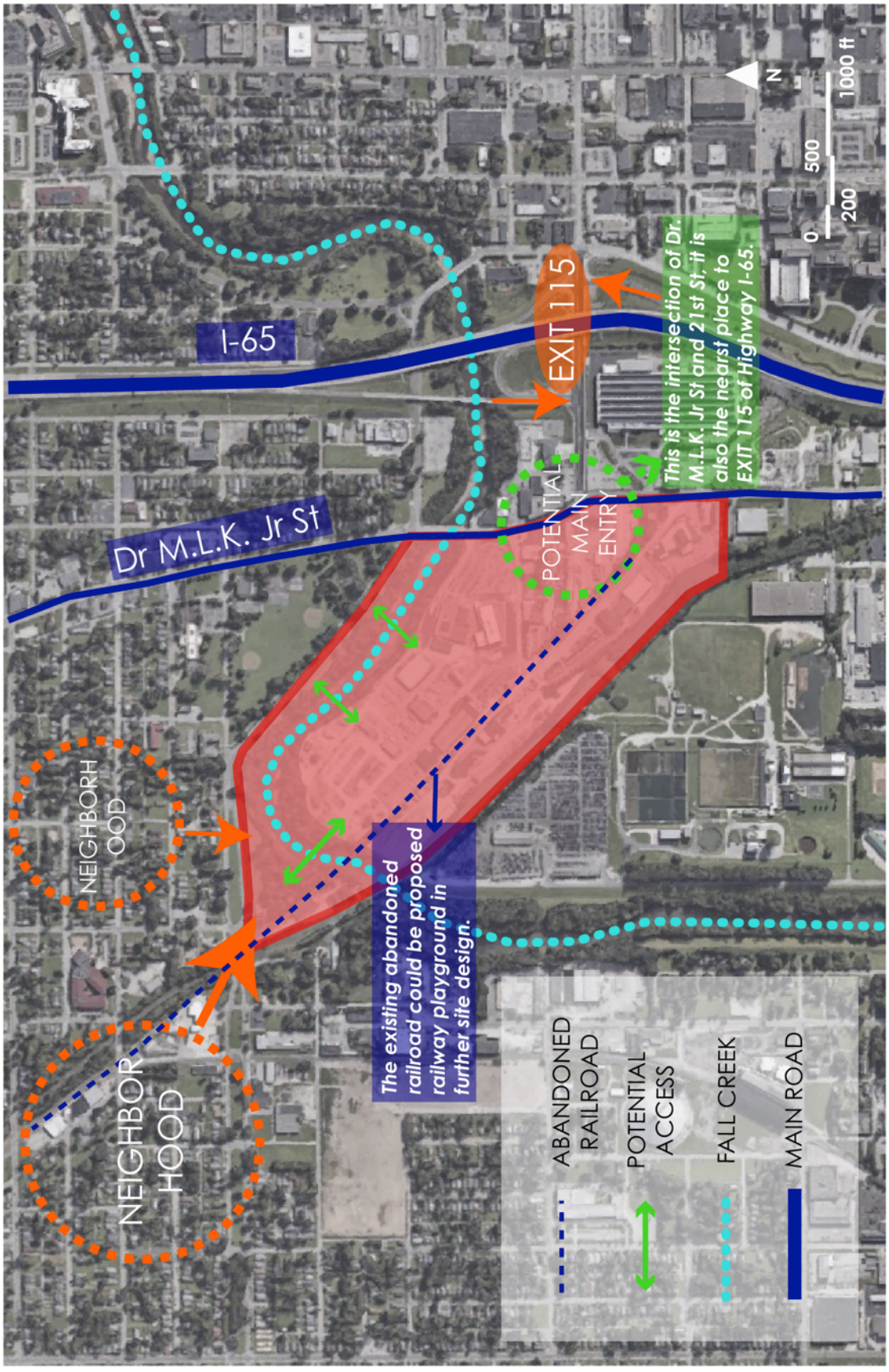


Figure 4-7. Site Transportation

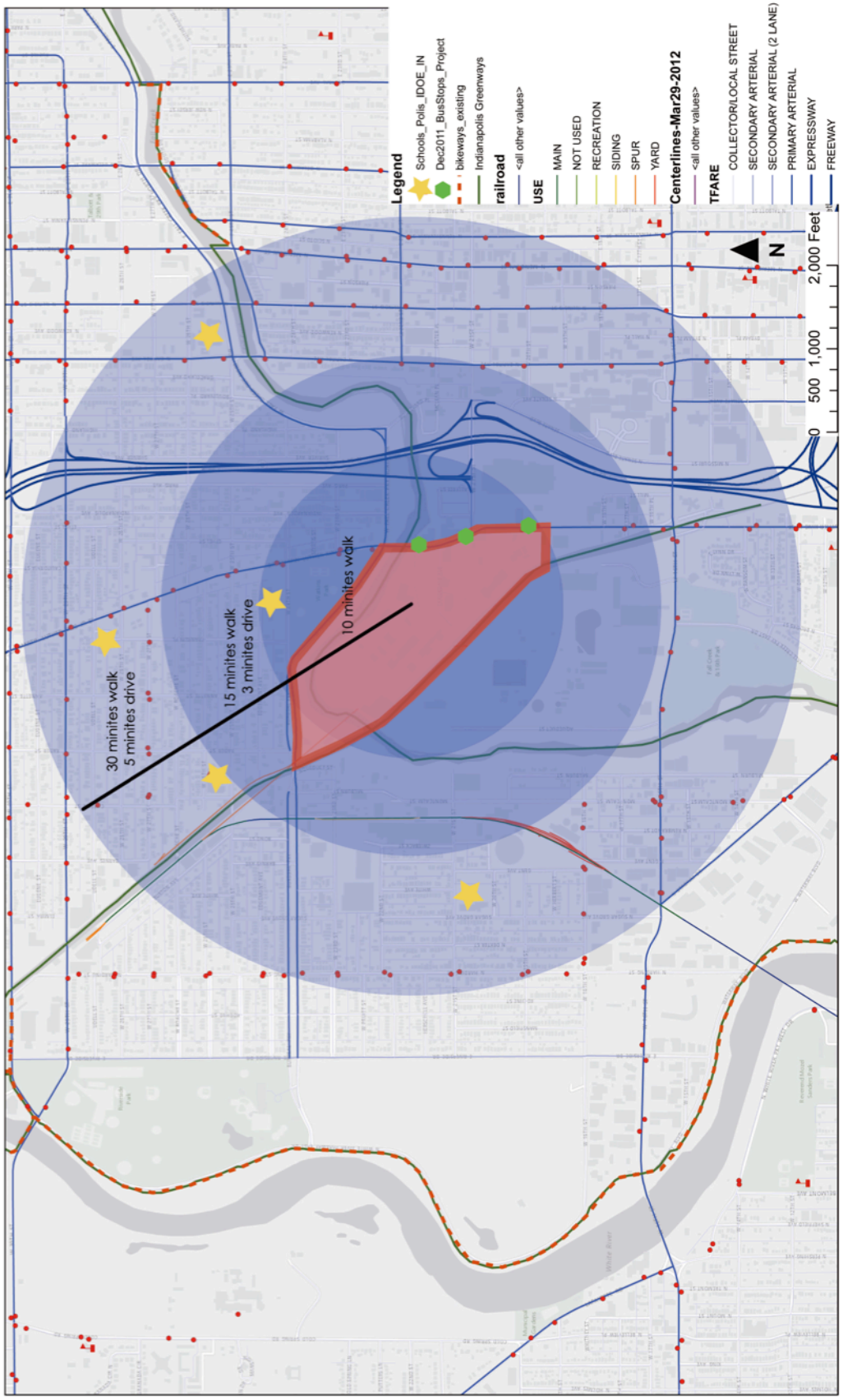


Figure 4-8. Site Context: Transportation Map

4.4.3 Land Use Analysis

The site is located in a mixed-use area, including the industrial area, mostly residential area, commercial area, institutional area and partly green space (See Figure 4-9). Most west, north, and east side of the site is the residential area. However, the south side adjacent to the site is industrial land. According, the inner site spaces, to the south, east are mostly beneficial for office and plant's staff design. To the north and west, designers need to consider more about local residents' requirements, as well as comfortable access for surrounded residents to the site. Commercial and institutional areas are located across from the industrial land in the southwest direction, and the east side extends to the downtown area. Therefore, how to bring people from these areas to the project site is another consideration of the project design.

Most of the site's surrounding communities are low-income groups, and the lack of supermarkets inside the community might make the living inconveniently. Therefore, the living requirements from north, west and east communities are extremely significant in further site design.

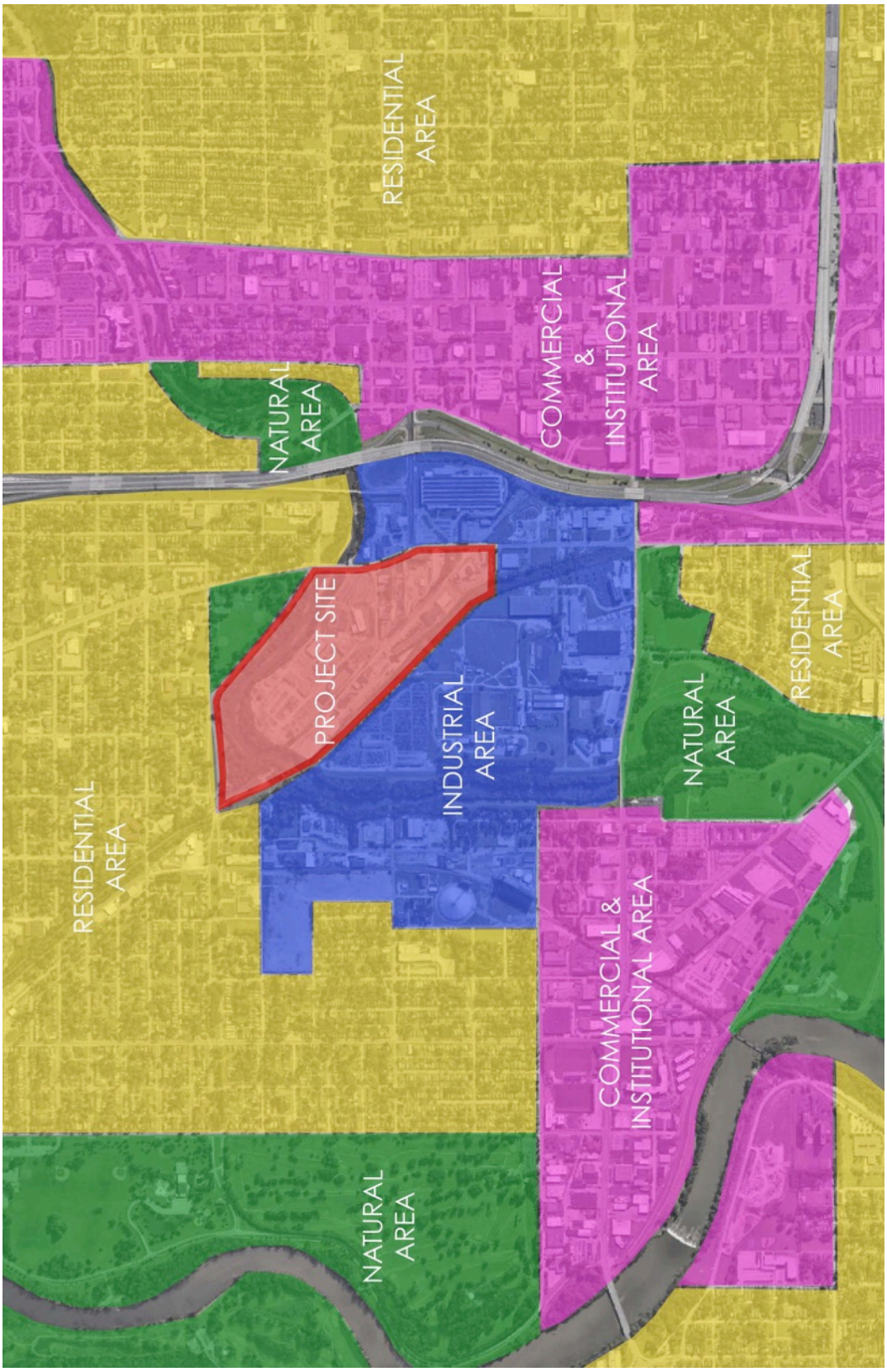


Figure 4-9. Land Use Map

4.5 Current Site Conditions

4.5.1 South Edge View

The south side of the project site is adjacent to the Indianapolis Water Treatment Plant, and the connecting edge is well fenced and cannot be entered by visitors. Both sides of the Central Canal are planted with tall grasses, and the grass height is already over people's eye level vision (See Figure 4-10). Therefore, the design should provide aesthetic value for visitors, and propose a green buffer to prevent people entering the Water Treatment Plant.

Figure 4-10. South Edge (adjacent to Water Treatment Plant)

4.5.2 Condition of Northwest site

A large portion of the site is covered with garbage and construction wastes (See Figure 4-12). Abandoned rails are covered by sandy soils on site (See Figure 4-11). It is a potential opportunity for further reuse in entertainment design. As revitalization and sustainable development of the White River and Fall Creek riverfront, the designer should make full use of the abandoned area to reclaim it to vibrant public space.

Figure 4-11. Abandoned rail

Figure 4-12. Northwest part of the site

4.5.3 Abandoned railroad bridge

Access to the abandoned railroad bridge is impeded by a massive iron gate, which happens to be unlocked. The plants appear to be weedy and overgrown, and the landscape view is natural feeling (See Figure 4-13). However, there is a 15-foot elevation difference from the bridge to the water surface.

Figure 4-13. Iron gate and overview of Fall Creek from the abandoned railroad

4.5.4 Condition near Republic Services

There are many large trash bins that belong to Republic Services on the site (See Figure 4-14). Finding appropriate methods to arrange these trash bins is essential in further project design process.

Figure 4-14. Trash Cans on site

4.6 Conclusion

Advantageous location makes the White River and Fall Creek riverfront site a unique choice compared to other places along the White River and its branches. The current site conditions provide the living, working and recreational opportunities to serve surrounded residents and

visitors. The requirements and demands of surrounded residents and visitors produce potential development significance to the project site.

4.6.1 Strengths

- The project site is located on the northwest side of downtown Indianapolis within 5 minutes drive and surrounded by different traffic corridors.
- The current water quality of the Fall Creek is good, and there is no need to solve the wastewater problem.
- The surrounding of the site are diverse areas including residential, commercial and recreational area. The various areas bring further development values to the project site.

4.6.2 Problems

- The existing greenway trail system does not pass through project site, which limits people's transportation choice to the site.
- Several industrial companies and plants are intricately distributed on site, which needs to be planned according.

4.6.3 Opportunities

- Northwest neighborhood is a large community with fewer grocery stores and public green spaces to satisfy their healthy living requirements. Their growing needs provide potential opportunity to create multi-purpose space in the project site, such as outdoor markets, festival spaces, picnics, or amphitheater for various events.
- Since there are several greenway trails and parks nearby, such as Towpath trail, Fall Creek trail, White River trail, Canal Walk and Riverside Park. It is an opportunity to provide more greenway trails on site to improve the greenway trail system.
- There is an abandoned railroad comes from the northwest through an elevated bridge over Fall Creek. It is an opportunity to redesign the railroad and open the security gate to keep the historical and cultural memory in site.

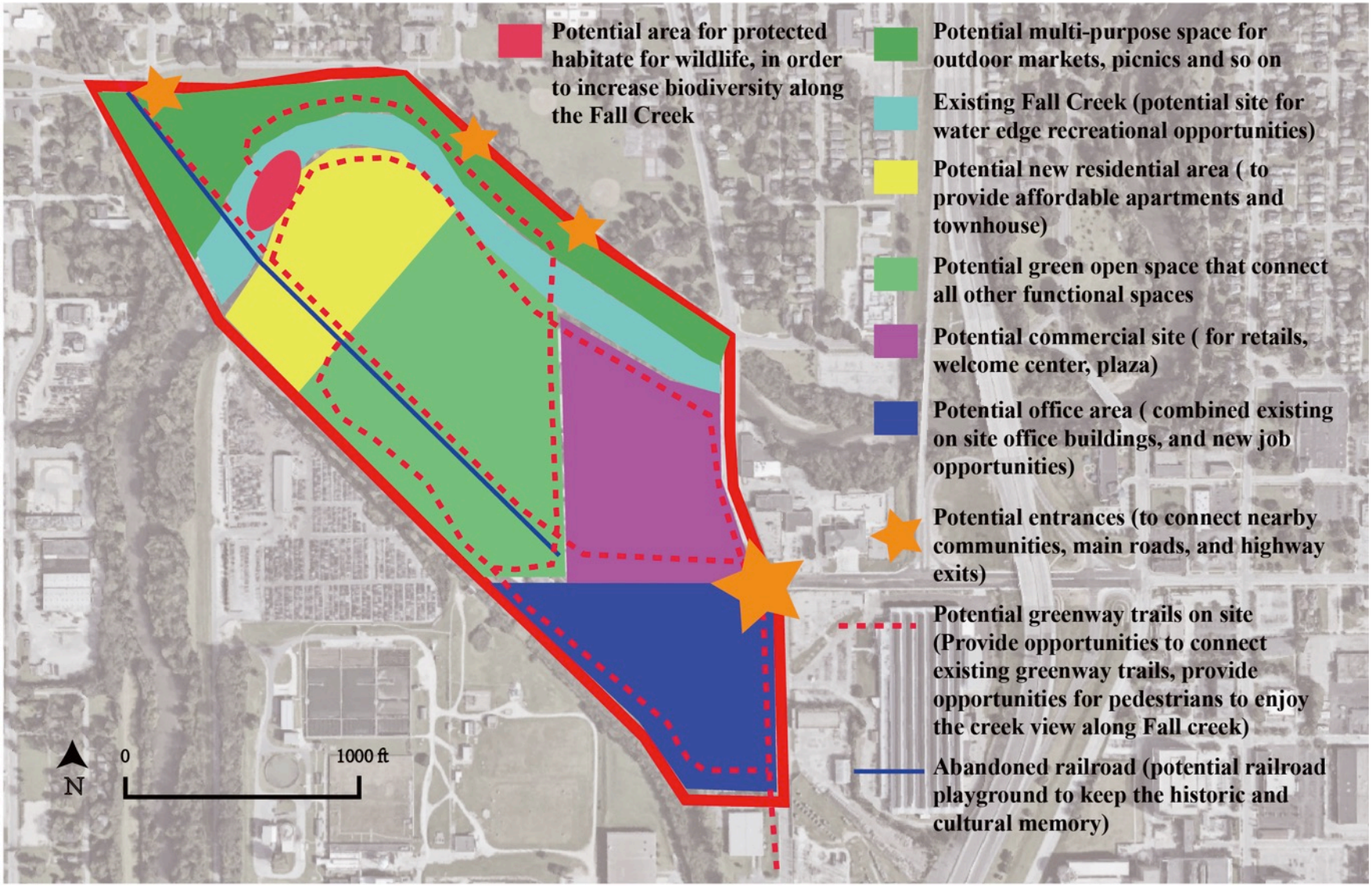


Figure 4-15. Site Opportunity Analysis

CHAPTER 5. SITE DESIGN

Based on the knowledge of Literature Review, Case study, and Site Inventory and Analysis, the creative project develops a sustainable urban design plan for the site redevelopment in Indianapolis. This chapter illustrates the design concept, introduces the design process and the site design.

5.1 Goals and Objectives

In order to contribute to a successful redevelopment process, the goals and objectives are listed below:

1. Providing more opportunities for surrounded residents and visitors to embrace the nature in the urban area
    1) Create a definite network to connect these underutilized sites with the green spaces
    2) Provide enough multi-function green space in each community area to support year-round outdoor activities (picnic, fishing, etc.)
    3) Develop Urban agriculture to provide fresh food and practices opportunities for local residents
    4) Improve transportation accessibility through redesigning the road circulation and reconstructing bridges
2. Revitalizing the urban economic development and improving residents' quality of life

1) Create commercial district, like retails, restaurants, and art gallery to provide more job opportunities for new residents
2) Proposed new affordable housing for new residents who work in the surrounded commercial areas
3) Provide lighting, seating, recreational area, etc. along the river bank
4) Providing diversified opportunities of activities for the local community
5) Provide easy accessible fresh food

3. Improve the site environment through Increase biodiversity along the Fall Creek
   1) Add native plant community
   2) Create protected habitats for wildlife (Natural preserve area)

5.2 Programs

In order to achieve the goals and objectives listed above, the proposed programs are listed below:

Public green space and outdoor activity area (Activity)

- Public Event Space
- Multifunction Plaza/stage
- Picnic area
- Fishing Piers

- Amphitheater (provide visitors access to water levels change, create seasonal interest)
- Natural stone bridge (offer walkways to pedestrians)

Industry and Office area (Work)

- Office Building
- Parking lot
- Public Event Space/Outdoor Green Space

Commercial area (Shopping, Activity)

- Welcome Center
- Retails
- Parking lot
- Multi-purpose spaces (outdoor markets, food vendors, or festival spaces)
- Bike Share

Community area (Housing, Food)

- Community center
- Affordable Apartments/Townhouse
- Farmer's market/Urban agriculture
- Playgrounds
- Sports area (Basketball, Tennis field)

Circulation redesign (Activity)

- Improve access convenience for north and west residents through connect existing road and adding bridges
- Trail system redesign to connect existing Indy Greenway Trail
- Railway play trail
- Replanning parking lot on site

5.3 Design Concept

In order to improve the site environment and the surrounding community's life quality, redevelopment of the site is proposed. The mixed-use community is redeveloped to provide the living, recreational opportunities, working opportunities, and traffic network to both local and future residents.

The concept of this creative project is to create a small convenient community that provides housing, food, open spaces and educational opportunities for people's daily life according to both local and future residents' requirement. The site will comprise the residential area, commercial area, working area, and public green space in the center to connect all other three functional areas.

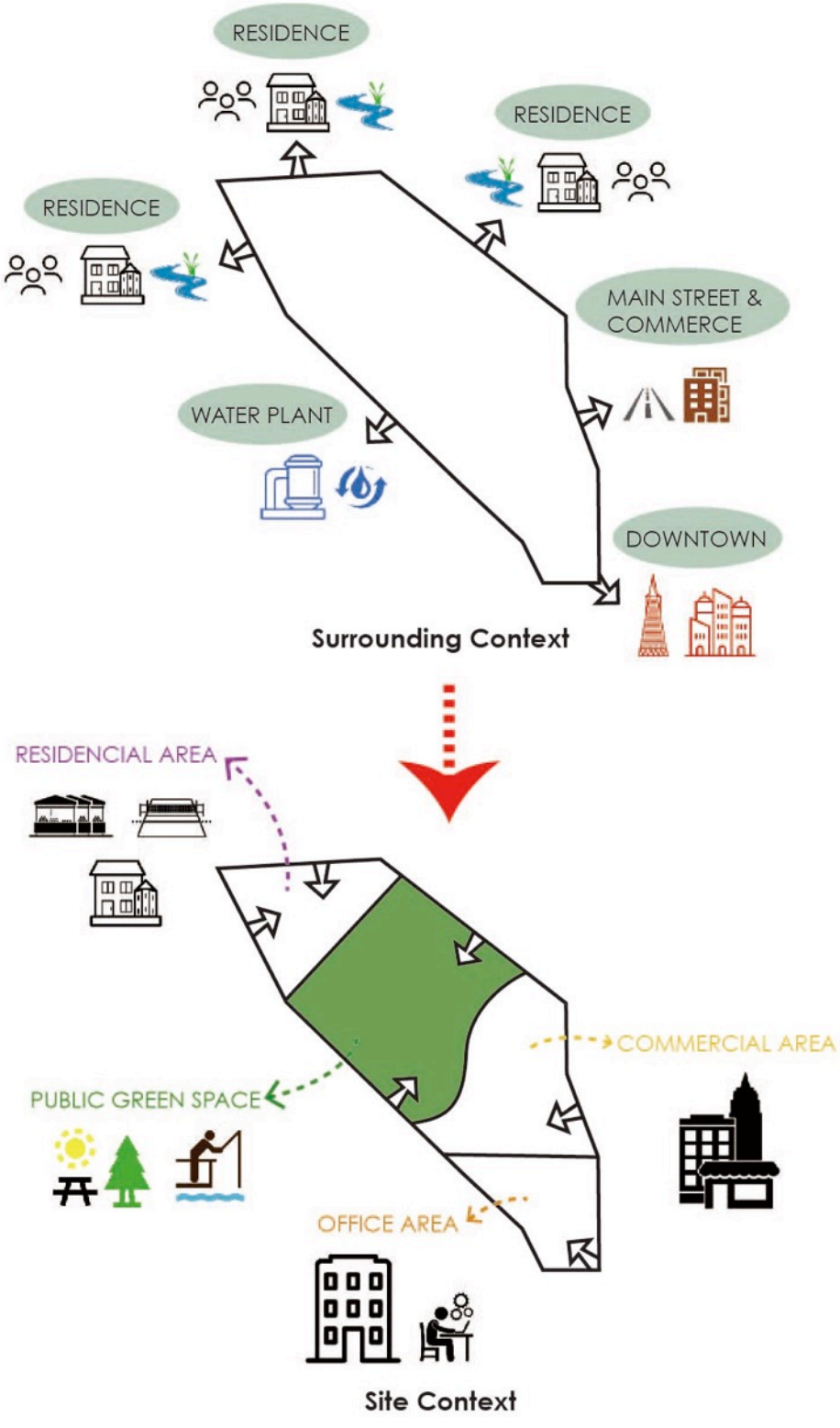


Figure 5-1. Concept Plan

5.4 Site Design

Figure 5-2. Master Plan

The land used to be a greyfield, and the final design provides the multi-functional riverfront green spaces that are essential to Indianapolis city development. The site is divided into four main areas - Public green space and outdoor activity area, Commercial area, Community area,

and Industry and Office area, all the four regions are connected by redesigned circulation. Public green space is the green core area of the site, and it aims at extending people's outdoor activity area from rare green space to a centralized green core area. It emphasizes environment advantage and human health through providing clean recreational places and sufficient green area to both residents and visitors. The commercial area is located on the right side of main entrance. It occupies an excellent geographic location of the site and is the best place to gather people together. Community area and Office area are located in northwest and southeast side respectively. They are connected by redesigned greenway trails and railway trail, which improves people's health through walking from home to workplace. It increases people's amount of exercise invisibly.

5.4.1 Linkage Plan

One of the project goals is creating a definite network to connect these underutilized sites with the green spaces. Therefore, the proposed project designed to use greenways that connect surrounding green spaces in Indianapolis.

There are several green spaces nearby, such as Riverside park, White River state park, and Martin park. The surrounded greenway trails are Towpath trail, Fall Creek trail, White River Wapahani trail, and Canal walk. All the greenway trails are within 1 mile from the project site, so using appropriate greenway trails to connect these existing trails and green spaces are

essential to the project (See figure 5-3). The blue lines are the existing greenway trails from the Greenway Linkage Plan, and red lines are the proposed greenway trails in the project.

Figure 5-3. Greenway Linkage Plan

Since using appropriate greenway trails to connect the existing greenway trails and open spaces are essential to the project, detailed site greenway trails design are considerable in the project design. The greenway trails connect all the functional areas, which provide walkable community for both residents and visitors (See figure 5-4). The project also provides further opportunities to connect surrounding greenway trails.

Figure 5-4. Detailed Site Greenway Trails

5.5 Site Detailed Design

5.5.1 Creek Recreation

As an essential component of the creative project, the Fall Creek is a tributary of the White

River. It used to provide water power for early industrial development in Indianapolis. It is currently designed as water features for the site, redesigned circulation greenway trails beside the creek provide an open view for people to enjoy the unique scenery across the Fall Creek. The final design aims to provide a diverse experience for people to pass through the greenway trail (See figure 5-5, 5-6, 5-7).

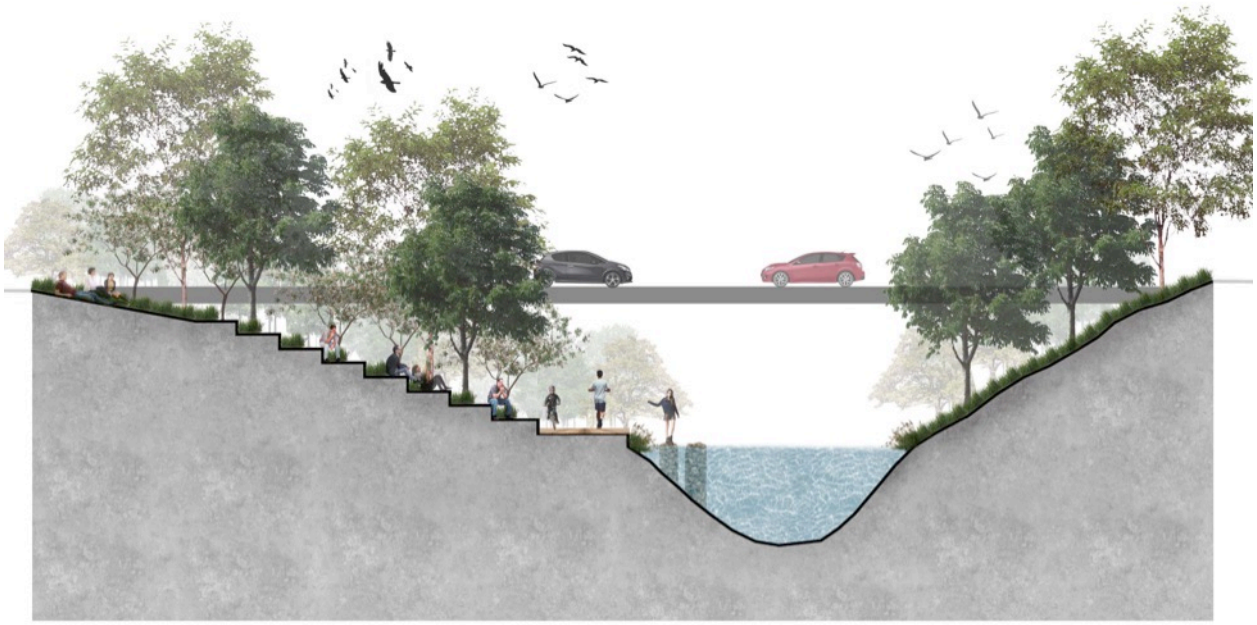


Figure 5-5. Creek Section – Amphitheater

This section shows the amphitheater seats in the north of public open space. The greenway trail around the site is followed by amphitheater beside the Fall Creek. There are some stone steps at the edge of the creek bank, which provide more opportunities for people to touch and play with water. It is an excellent place for people's chatting, meditation, sitting in the sun, and

parents-child campaign.

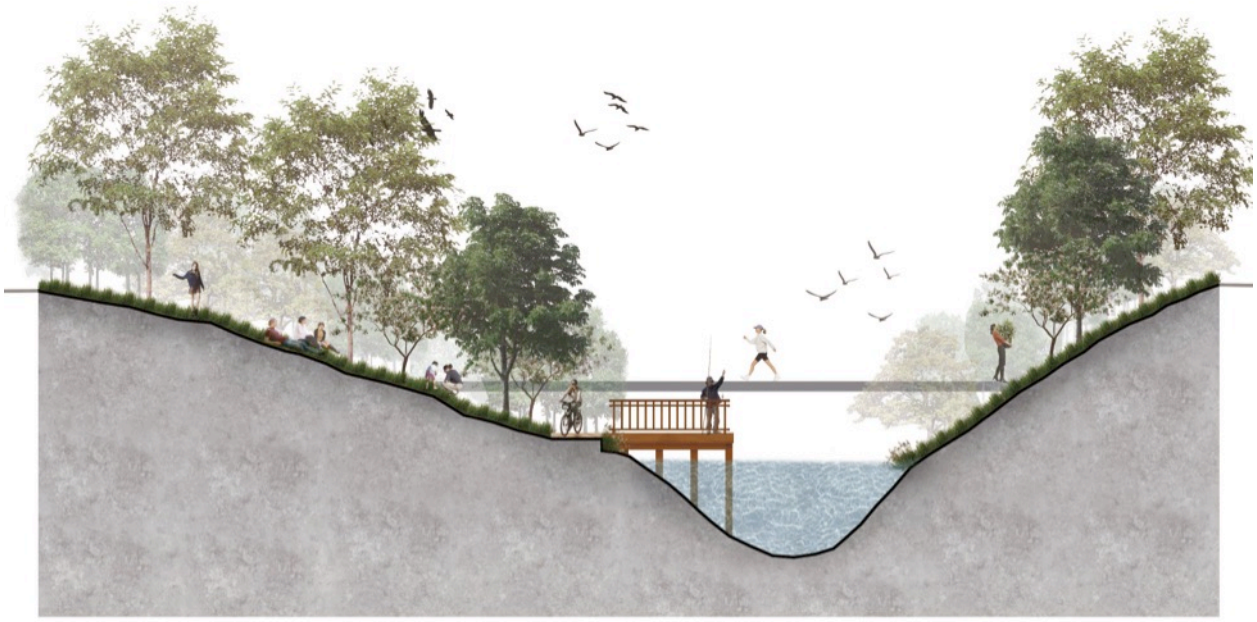


Figure 5-6. Creek Section – Fishing pier

This section shows the fishing piers along the Fall Creek, both in community area and public open spaces. The fishing piers provide fishing entertainment for people. Since there is a significant height difference between creek edge and main site, the final design creates the sloping lawn in part area of the designed site that provides enough outdoor picnic area for surround residents and visitors.

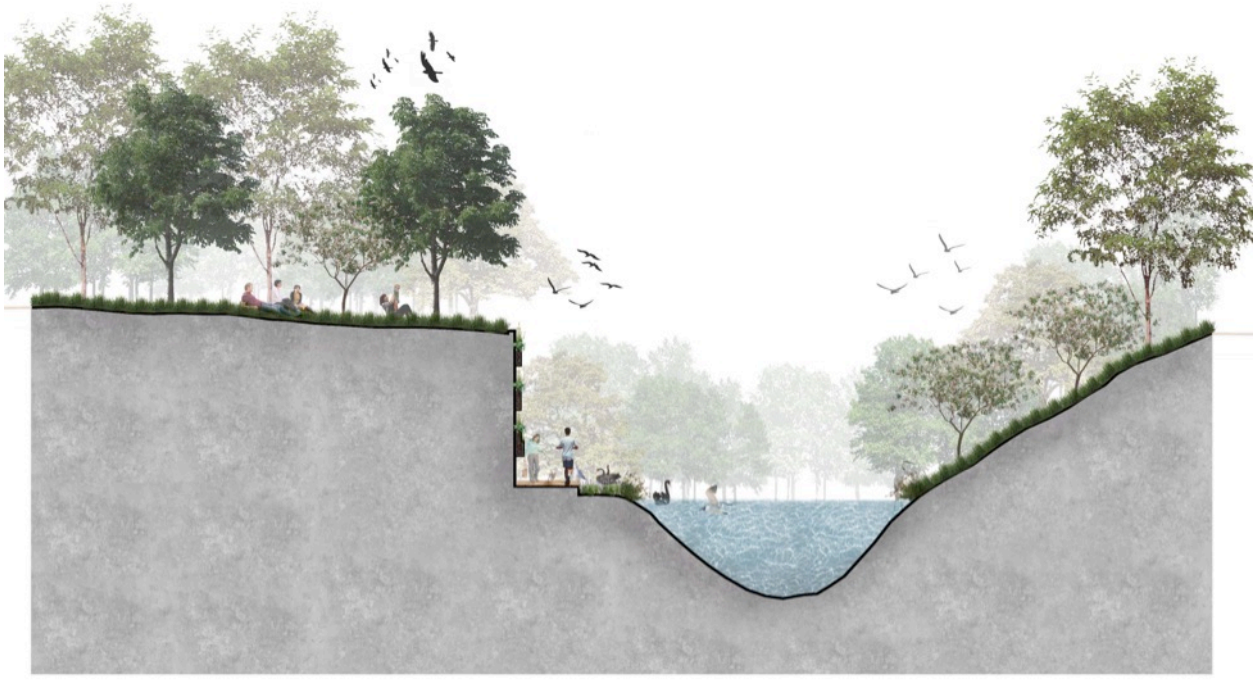


Figure 5-7. Creek Section – Greenway trails

This section shows the greenway trails beside the creek with wall interests in the other side. As mentioned above, there is a significant height difference between creek edge and main site. So the design keeps the height difference in some area and creates vertical green plants on the wall. There is also a green buffer between greenway trails and creek, which provides the more natural environment for animals.

5.5.2 Canal Recreation

Canal in the south of the project site that is 15 feet higher than the Fall Creek water surface. The function of the canal is different from the function of the Fall Creek. The canal provides domestic water for people's daily life, however, the Fall Creek could provide recreational place for people to gather and play together. Therefore, the design for the two different water body is diverse. The design uses grasses and shrubs to create green buffer between canal and greenway trails. Lower grasses and shrubs will not hide people's view sight, but will prevent access to the canal.

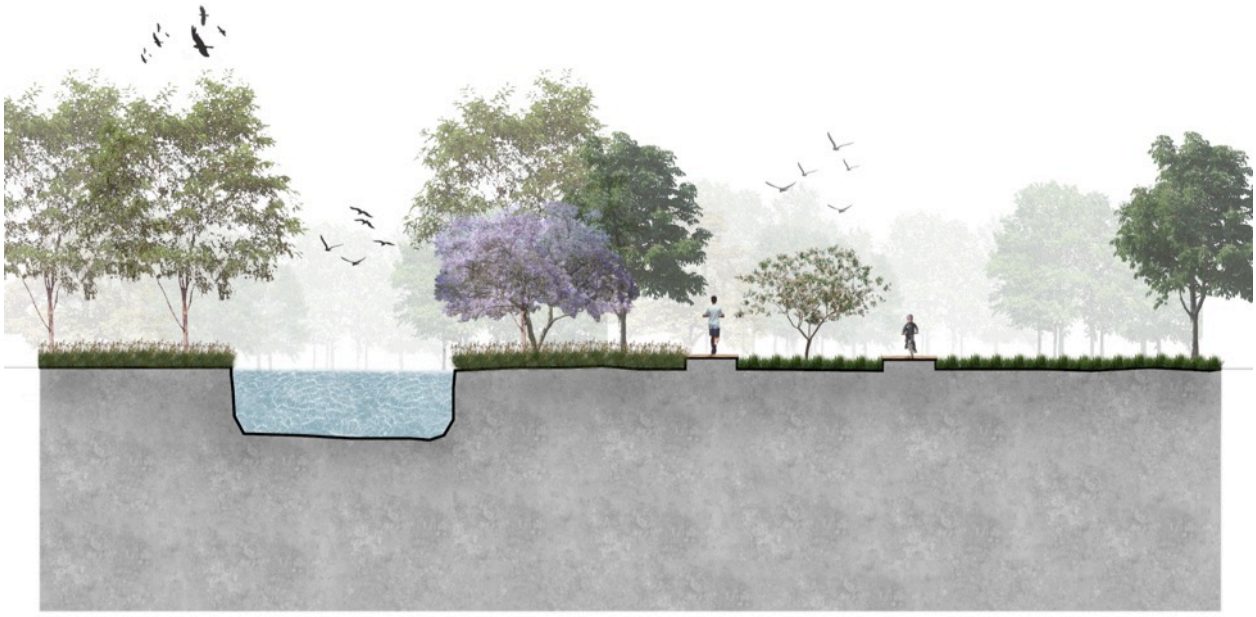


Figure 5-8. Canal Section – Greenway trails

Figure 5-9. Environment Around Canal area

5.5.3 Commercial Area

The commercial area (the orange region) is located on the northeast side of the site. It is on the right side of the main entrance and parking lot, which provides more access opportunities for people to the commercial area. This area consists of Welcome Center, retails, art gallery, restaurants, multi-purpose spaces, and parking lot, which provide diverse study and entertainment opportunities for people and more job opportunities for residents.

Figure 5-10. Commercial Area – Welcome Center

The welcome center is a diverse functional place that connects parking lot and retails. It comprises of the reception area, bike share, multi-functional plaza, and food court. The multi-functional plaza is in front of the welcome center, and it is a public place which provides gathering, resting area, and food for people. It also provides introduction and consultation services for visitors.

5.5.4 Public Green Space

Public green space and outdoor activity area are located in the center of the project site, which connects all other three areas – commercial, community, and office area. It includes public event space, amphitheater, multifunction plaza, picnic area, railway trail playground, and fishing piers. There are varying pedestrian walkways in the open green space that encourage people to explore all the public green space of the site.

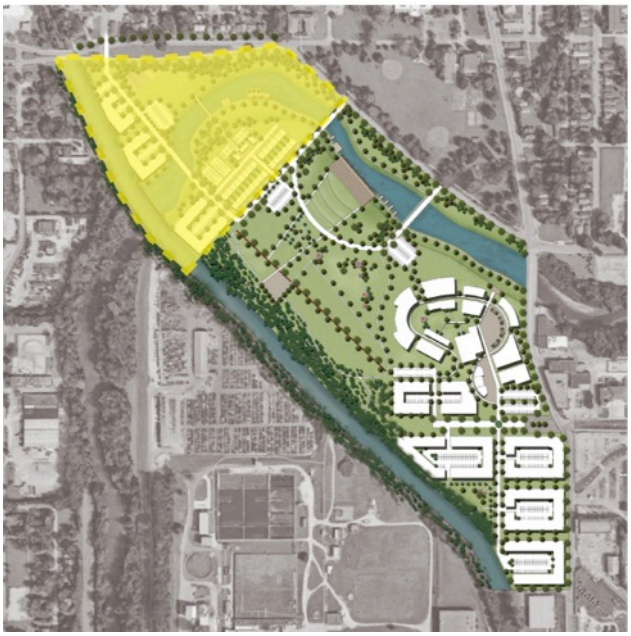
Figure 5-11. Public Green Space – Railway play trail

The railway play trail is transformed from an abandoned railway that across the site. The project redesigns the abandoned railways into the trail and establishes small plazas nearby for people's resting and activity. In order to increase identification of the railway trail, the design represents the rusted rails into a bright red color that increase the color interests of the site.

Figure 5-12. Public Green Space – Amphitheater

The amphitheater area is a great space for people's diverse activities, such as chatting, meditation, sitting in the sun, and parents-child campaign. There is a pavilion beside the amphitheater, and it is an area that provides shelter for people in rainy days and fishing activity. There are also some stone steps along the edge of Fall Creek, and people could be close to the water if walking on the stone steps.

5.5.5 Community Area



The community area is located in the northwest of the site, and it is near the existing communities which mostly distributes in the north and west side of the project site. It includes a community center, affordable apartments, and townhouse, playgrounds, sports area, greenway trails, farmer's market and grove that is across Fall Creek. In order to offer transportation convenience for the residents, the design adds two entrances in north and northeast side. The north side design extends Rader Street and intersects with Burdsal Pkwy. The northeast side design connects the existing Franklin Place and crosses Fall Creek Blvd.

Figure 5-13. Community Area – Farmer’s Market & Grove

The farmer's market and the grove is located in the northwest corner of the site, which is across the Fall Creek. It is an appropriate place for urban agriculture and farmer's market. It is not only adjacent to the designed community area, but also near surrounding communities. The goal that provides easily accessible fresh food is realized through the farmer's market and grove production.

Figure 5-14. Community Area – Greenway Trails

Greenway trails are designed to connect existing Indy Greenway Trails - Towpath trail, Fall Creek trail, Monon trail, Canal walk, White River Wapahani Trail, and Cultural Trail. It is an effective method to improve access convenience for people to walking or running in Indianapolis downtown area. It also provides more opportunities for people in the surrounding neighborhood to enjoy the unique scenery around the Fall Creek and embrace the nature in the urban area.

Figure 5-15. Natural Preserve Area

The natural preserved area is located in the community area along Fall Creek. The landscape planting design strategy in this area is to use Indiana native plants to create a protected habitate for wildlife as well as increase biodiversity along the Fall Creek. There are a variety species of trees, shrubs, grasses, and seasonal flowers to provide natural environment for wildlife (See Figure 5-12).

Juniperus virginiana
Eastern redcedar

Acer rubrum
Red maple

Viburnum dentatum
Southern arrowwood

Cephalanthus occidentalis
Buttonbush

Lindera benzoin
Spicebush

Sorghastrum nutans
Indiangrass

Sporobolus heterolepis
Prairie dropseed

Mertensia virginica
Virginia bluebells

Echinacea purpurea
Eastern purple coneflower

Goldsturm
Black Eyed susan

Figure 5-16. Plants that grow in natural preserved area

5.5.6 Industry and Office Area

The industry and office area is located in the south of the site. It contains office buildings, parking lot, public outdoor green space and sports area. Some existing office buildings are scattering built on the site, finding an appropriate area to gathering all these companies together is essential in the design process. There is a small outdoor green space in the southwest corner of office area, which provides outdoor relaxation for office workers.

CHAPTER 6. CONCLUSION

This creative project redevelops a riverfront site from underutilized and troubled land to the healthy and productive urban land in downtown Indianapolis. It helps to promote the urban economic development, as well as bring environment advantage to people's life.

There are numerous small vacant or underutilized lands along White River and its branches in the core area of Indianapolis. The goal of this creative project is to create an easeful and fully functional living space for both residents and visitors. This project analyzes the problems and conditions of current site environment. It also reviews the literature and case studies to establish a reasonable design program for further development. The design includes four functional spaces – public green space, commercial area, community area, and office area, and one circulation redesign that in order to connect existing green spaces and for further underutilized lands redesign.

The redesign of this creative project could serve as a prototype to other similar vacant or underutilized riverfront lands redesign in Indianapolis urban area. These solutions can also be applied or partially applied to other underutilized lands on the basis of land size in all other similar medium-sized cities.

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